CQ

May 1971
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FCC proposes widening of phone bands

FEDERAL COMMUNICATIONS COMMISSION
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The Radio Amateur's Journal
08240

DX Maxi-Rig...

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Whether you're chasing the rare ones in AC3-land or the Rare Ones in New Orleans . . . sweating out that seemingly impossible 5-band DXCC or looking for #50 for WAS . . . chatting with the crew at the South Pole or working everyone's friend in 9N1-land – if you work serious DX, you need the best gear you can get: the Heathkit DX Maxi-Rig.

The DX Maxi-Rig: the SB-303, hot new all solid-state receiver that's made DX easier to work than ever. The SB-401, the most popular transmitter on the air because of its modest price, top performance and high reliability. The SB-220, 2 kW linear that made history when it was introduced because of its low, low price and red hot performance.

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SBA-301-2, optional 400 Hz CW Xtal fltr., 1 lb.	**21.95***
Kit SB-401, 36 lbs.	**299.95***
Kit SB-220, 69 lbs.	**349.95***

SB-303 SPECIFICATIONS – Frequency Range: (MHz) – 3.5 to 4.0, 7.0 to 7.3, 14.0 to 14.5, 15.0 to 15.3, 21.0 to 21.5, 28.0 to 30.**Intermediate Frequency:** (IF) – 3.395 MHz. **Frequency Stability:** Less than 100 Hz drift per hour after 10 minutes warmup under normal ambient conditions. Less than 100 Hz drift for ±10% line voltage variation. **Frequency Selection:** Built-in Linear Master Oscillator. **Modes of Operation:** SSB – Single sideband (suppressed carrier, with selectable upper or lower sideband.) CW – Keyed continuous wave. AM – Amplitude modulated continuous wave. RTTY – Radio teletype (frequency-shift keyed continuous wave). **Sensitivity:** Less than 0.25 uV for 10 dB S+N/N for SSB operation. **Overall Gain:** Less than 1.5 uV input for 0.5 audio output (single tone SSB). **AGC Characteristics:** Blocking – Greater than 3.0 V CW/SSB/RTTY. Dynamic Range – Greater than 150 dB CW/SSB. **RF Attenuator:** Variable 0-40 dB nominal. **Selectivity:** SSB – 2.1 kHz @ 6 dB down, 5.0 kHz maximum @ 60 dB down (crystal filter supplied). CW – 400 Hz at 6 dB down, 2.0 kHz maximum at 60 dB down (crystal filter available as an accessory). AM – 3.75 kHz at 6 dB down, 10 kHz maximum at 60 dB down (crystal filter available as an accessory). RTTY – 2.1 kHz at 6 dB down, 5.0 kHz maximum at 60 dB down (uses SSB crystal filter). **Image Rejection:** 60 dB or better. **IF Rejection:** 3.395 – greater than 55 dB. 8.595 – greater than 50 dB. **Spurious Response:** All below 1 uV equivalent signal input. **Temperature Range:** 10°C ambient. **Dial Accuracy:** Electrical – Within 400 Hz after calibration at nearest 100 kHz or 25 kHz point. Visual – Within 200 Hz. **Calibration:** Every 100 kHz or 25 kHz. **Dial Backlash:** No more than 50 Hz. **Antenna Input Impedance:** 50 ohm nominal unbalanced. **Power Requirements:** 105 to 125 or 210 to 250 VAC, 40 W max. **Dimensions (with knobs & feet installed):** 12¼ W x 7 15/16″ H x 14″ D. **Net Weight:** 15¾ lbs.

SB-401 SPECIFICATIONS–Emission: SSB (upper or lower sideband) and CW.**Power input:** 170 watts CW, 180 watts P.E.P. SSB. **Power output:** 100 watts (80-15 meters), 80 watts (10 meters). **Output impedance:** 50 to 75 ohm–less than 2:1 SWR. **Frequency range:** (MHz) 3.5–4.0; 7.0–7.5; 14.0–14.5; 21.0–21.5; 28.0–28.5; 28.5–29.0; 29.0–29.5; 29.5–30.0. **Frequency stability:** Less than 100 Hz per hr. after 20 min. warmup. **Carrier suppression:** 55 dB below peak output. **Unwanted sideband suppression:** 55 dB @ 1 kHz. **Intermodulation distortion:** 30 dB below peak output (two-tone test). **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone (Grid block keying). **CW sidetone:** 1000 Hz. **ALC characteristics:** 10 dB or greater @ 0.2 mA final grid current. **Noise level:** 40 dB below rated carrier. **Visual dial accuracy:** Within 200 Hz (all bands). **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point (all bands). **Backlash:** Less than 50 Hz. **Oscillator feedthrough or mixer products:** 55 dB below rated output (except 3910 kHz crossover which is 45 dB). **Harmonic radiation:** 35 dB below rated output. **Audio input:** High impedance microphone or phone patch. **Audio frequency response:** 350-2450 Hz ±3 dB. **Power requirements:** 80 watts STBY, 260 watts key down @ 120/240 V AC, 50/60 Hz. **Dimensions:** 14⅞″ W x 6⅝″ H x 13⅜ D.

SB-220 SPECIFICATIONS – Band coverage: 80, 40, 20, 15 and 10 meter amateur bands. **Driving power required:** 100 watts. **Maximum power input:** SSB: 2000 watts P.E.P. CW: 1000 watts. RTTY: 1000 watts. **Duty cycle:** SSB: Continuous voice modulation. CW: Continuous (maximum key-down 10 minutes). RTTY: 50% (maximum transmit time 10 minutes). **Third order distortion:** –30 dB or better. **Input impedance:** 52 ohm unbalanced. **Output impedance:** 50 ohm to 75 ohm unbalanced; SWR 2:1 or less. **Front panel controls:** Tune, Load, Band, Sensitivity Meter switch, Power CW/Tune – SSB, Plate meter, Multi-meter (Grid mA, Relative Power, and High Voltage). **Rear Panel:** Line cord, Circuit breakers (two 10 A). Antenna Relay (phono), ALC (phono), RF Input (SO-239). Ground post. RF output (SO-239). **Tubes:** Two Eimac 3-500Z. **Power required:** 120 VAC, 50/60 cycles, at 20 amperes maximum. 240 VAC, 50/60 cycles at 10 amperes. **Cabinet size:** 14⅞″ W x 8¼″ H x 14½″ D. **Net weight:** 48 lbs.

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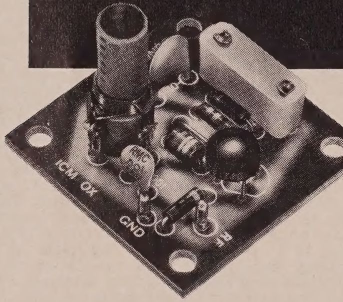

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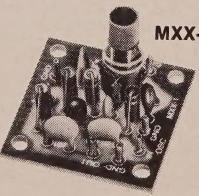
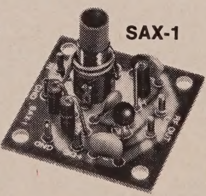
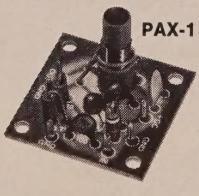


MXX-1



SAX-1



PAX-1

BAX-1

Write for complete catalog.

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CQ

MAY, 1971 VOL. 27, NO. 5

The Radio Amateur's Journal

STAFF

EDITORIAL

RICHARD A. ROSS, K2MGA
Editor

ALAN M. DORHOFFER, K2EEK
Managing Editor

IRVING TEPPER, WB2FUZ
Technical Editor

WILFRED M. SCHERER, W2AEF
Technical Director

JOAN WEILBACHER
Editorial Assistant

CONTRIBUTING

FRANK ANZALONE, W1WY
Contest Calendar

GEORGE JACOBS, W3ASK
Propagation

BYRON H. KRETZMAN, W2JTP
RTTY Consultant

A. EDWARD HOPPER, W2GT
USA-CA

JOHN A. ATTAWAY, K4IIF
DX

GORDON ELIOT WHITE
Surplus Sidelights

ALLEN KATZ, K2UYH
VHF Today

BUSINESS

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President

RICHARD A. COWAN, WA2LRO
Publisher

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Advertising Director

HAROLD WEISNER, WA2OBR
Circulation Director

GLORIA FORSYTH
Circulation Manager

PRODUCTION

WILLIAM H. TRAVIS
Art Director

DAVID R. LANCE
Staff Artist

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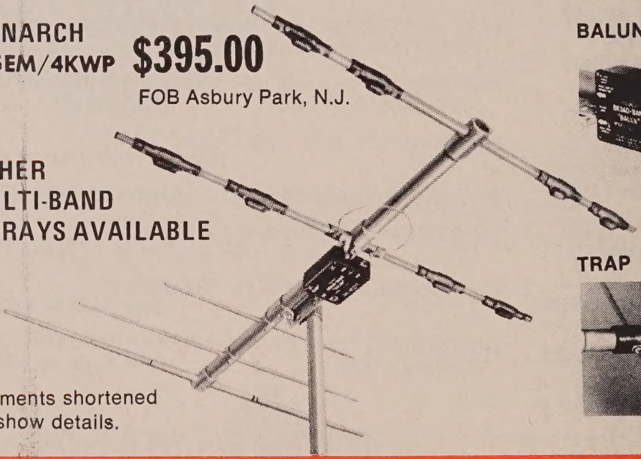

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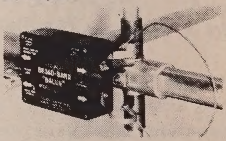

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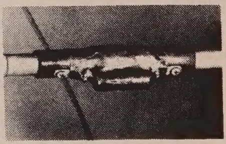

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ZERO BIAS

For years we've gotten sick over the drivel that W2NSD/1 has foisted on the amateur radio fraternity in the guise of editorial comments in *73 Magazine*. More often than not, we've overlooked his little barbs and half-truths, rationalizing to ourselves that most well-informed hams know him for what he is. But Mr. Green evidently works on the Hitlerian theory that if you tell a lie big enough, and often enough, sooner or later it will be believed. Last month's *73* editorial was the straw that broke the camel's back.

In the January issue of *CQ*, our editorial prematurely announced a rough draft of a petition being considered by a manufacturer's group to allocate half of the two-meter amateur radio band to the Citizens Radio Service. Our editorial clearly and loudly screamed for the withdrawal of such a proposal. (Our exact statement: "It is without reservation that *CQ* goes on record as being vehemently opposed to the institution of any amateur band as an extension of the Citizen's Radio Service, even on a shared basis.") And, in fact, the proposal was almost immediately withdrawn as a direct result of *CQ's* activity. This statement can be substantiated to any readers who wish us to do so.

Now, it seems, that the latest editorial of *73 Magazine* has maliciously libeled *CQ's* publisher, accusing him of having been responsible for the original proposal. In the truest traditions of yellow journalism, the publisher of this other magazine states:

> "Industry insiders intimate that this scheme was cooked up by the publisher of *S9* (also publishes *CQ)* magazine. Since this was virtually admitted in a recent *CQ* editorial there seems little reason to doubt the reports."

In other words, W2NSD/1 has blatantly planted the seeds of a rumor obviously designed to embarass *CQ's* publisher with the amateur fraternity, despite his obvious awareness that *CQ's* stand was directly against the original proposal. In fact, he practically admits that *CQ's* editorial squelched the whole idea later in his own editorial where he states,

> "Fortunately, news of the attempt the emasculate 2 meters leaked out at the last minute and, hopefully, the effort stopped—at least temporarily."

Leaked out, indeed! It was *CQ* that made the ham fraternity aware of the situation and it was *CQ's* editorial that squelched it before it got off the ground.

We feel that Mr. Green has deliberately and maliciously attempted to discredit *CQ's* publisher, and we demand an immediate retraction in the next available issue of *73*. Furthermore, in the event that such a retraction be not forthcoming, our attorneys are prepared for legal recourse for both actual and punitive damages. This time Mr. Green has gone a bit too far.

Important Happenings at FCC

The biggest news anywhere this month is a Proposed Rule Making by FCC regarding the expansion of the Telephony sub-bands on the bands from 80 through 10 meters. In action taken by the Commission on February 24, 1971, a shifting of phone segment boundaries was proposed to finally give real incentive, to phone operators at least, to progress to the Advanced and Extra class licenses. Without attempting to describe the details of the Docket here, we will simply refer you to page 56 of this issue for the complete text of the Docket, and add as a footnote that *CQ* is lending the full weight of its influence to ensure passage of the proposal. On page 7 is a guest editorial by Jerry Hagen, WA6GLD, *CQ*'s WPX and DX Awards Manager. It states our position with clarity. Interestingly, one additional point in the new proposal would reduce the present 25 kc Extra class c.w. segments to 10 kc as originally proposed by *CQ's* DX Editor John Attaway, K4IIF, who met partial success when FCC decided not to institute the additional 25 kc c.w. suband on November 22, 1969.

On page 52 is the gist of another FCC action; this one an order adopted February 24, 1971 altering the frequency allocations and power limitations for 160 meter operation in the U.S. The order is highly beneficial to U.S. 160 meter operation since all 49 continental United States are now permitted operation in the 1800-1850 kc segment. Only the state of Hawaii, Midway, Palmyra and Jarvis Is. may not operate in this segment. In addition, in most areas, maximum power limitations for at least one 25 kc segment have been raised to 500 watts (day)/100 watts (night), or 1000 watts (day)/200 watts (night). Are things looking up for amateur radio? It certainly looks that way.

73, Dick, K2MGA

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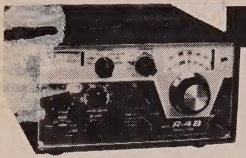

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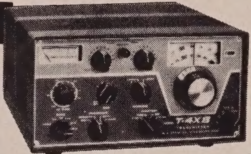

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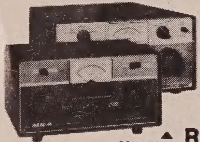

MN-4 MN-2000

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Integral Wattmeter: fwd pwr in watts and VSWR direct • Can read refl pwr • Matches xmtr to ant VSWR 5:1

MN-4	200 watts	**$ 99.00**
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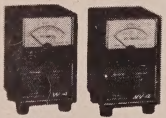

W-4 WV-4

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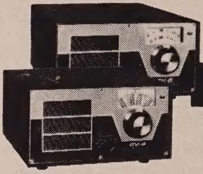

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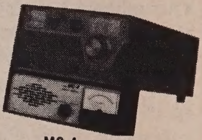
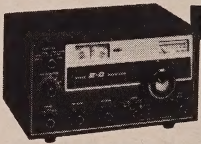
MC-4 Mobile Spkr/Wattmeter	**$ 69.00**



MC-4

HAMS SAY . . . ***"Best Receiver buy since the 2-B"***



2-C Receiver

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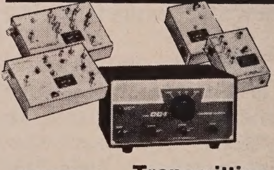

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Phone Band Expansion

A GUEST EDITORIAL BY JERRY HAGEN,* WA6GLD

By this time you have no doubt heard of the proposed rulemaking by the FCC to alter the h.f. Amateur bands to allow a more equitable division of frequency usage by General, Advanced and Extra class licenses. Basically, the proposal broadens the current phone sub-bands on the 3.5 thru 28 mc making these additional frequencies available to Extra and Advanced class amateurs and leaving a larger portion of the pre-incentive phone bands for the General class amateur. As some would put it, "this puts *real* incentive in incentive licensing." The proposal also calls for limiting the Extra class c.w. band to the bottom 10 kc of the 3.5 thru 21 mc bands. The precise breakdown is shown below in graph form.

This proposed rulemaking was brought about by numerous petitions to the FCC by active and concerned amateurs. After 2-plus years of incentive licensing many amateurs feel that the allocation of frequencies between license classes does not provide full use of the amateur spectrum and has caused severe crowding especially on the General class portions of the 3.8, 7 and 14 mc bands where many public service and other nets are held. (Have you listened to the 3.9-4.0 mc segment during the past winter?) As s.s.b. is becoming increasingly popular and the congestion is severe it seems logical that this proposal would greatly benefit the growth and welfare of the U.S. amateur as well as increasing his efficiency for public service.

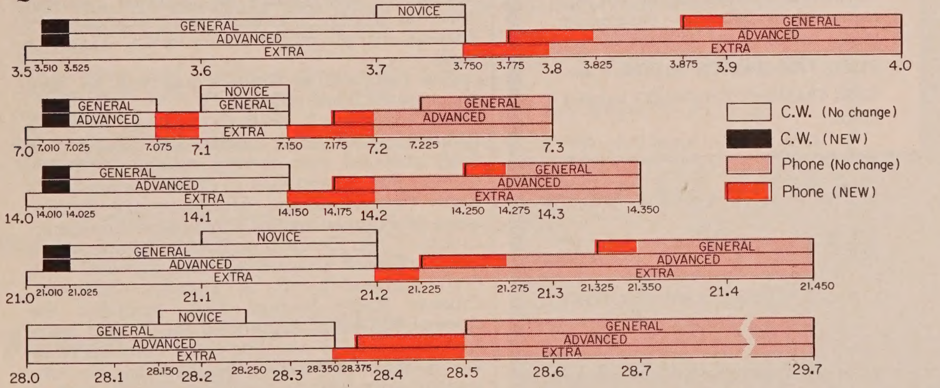
The FCC has set June 1, 1971 as the deadline for filing comments by amateurs after which the proposal will be re-evaluated in the light of comments received. Throughout the years the FCC has been most cooperative in being responsive to the needs of the amateur and changes of the type proposed are formulated at the request of amateurs and comments are thoroughly considered before regulation modifications are effected. In citing the reasons for adoption of incentive licensing the FCC stated that over 60 per cent of the comments received were in favor of an incentive system. However, with over 250,000 amateurs in the country, less than 6,000 comments were received by the FCC. Thus it is felt that the best action to support this proposal is individual comment in writing to the FCC. When writing to the Commission, be sure to state your position, any exceptions to the proposal that you may have, and to indicate your call letters!

If you are an ARRL member and support Docket 19162, you've got the possibly difficult job of convincing your ARRL Director to support *your* position. ARRL has already laid the groundwork for opposition to any proposed phone-band expansion. See page 78, Sept. '70 *QST*, and paragraph 13 of the 1970 ARRL Board Meeting Highlights, page 69, July 1970 *QST* for background material. On page 56 of this issue of *CQ*, however, is the complete text of Docket 19162, in which FCC examines the objections repeatedly voiced by League spokesmen to phone band expansion, and dismisses these objections as no longer significant. See paragraph 7 of Docket 19162.

We expect that ARRL will withhold official comment on the Docket until after its May 1971 Board of Directors Meeting to permit any ARRL position to represent the feelings of the Board. It is up to *all* ARRL members to do their utmost to ensure that their Directors vote *as they have been directed by their constituents.* That means you!

Even without ARRL support, Docket 19162 stands an excellent chance of becoming law, but *with* the strength of ARRL behind it, we feel it's a certainty.

CQ fully endorses Docket 19162 and urges your support also. Thus, we have available for an s.a.s.e an information sheet designed to help you voice that support, including a suitable form letter which may be copied should it state your exact views. Write to Phone Band Expansion, c/o *CQ*, 14 Vanderventer Ave., Port Washington, N.Y. 11050.



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*CQ WPX/DX Award Manager.

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OUR READERS SAY

Letters from the Misguided

Editor, *CQ:*

Boy, if your newest "brainstorm" doesent take the cake, I dont know what does. It really gets me sick to think that you would have the gall to propose giving away half of 2 meters to those raving maniacs known as CBers. I was ready to subscribe to *CQ* until I learned of your boondoggle. All that giving 2 m. to CBers would do, is increase *S-9*'s subscription circulation; and get you more money. Of course, I'm sure that all you care about is money, no matter how you get it. You'll be happy as long as all that yummy money keeps pouring in. I sure am glad that the guys at *QST, Ham Radio* and *73* dont feel the same way.

Sam-the-Ham

Editor, *CQ:*

Don't let *"CQ"*, sell itself out to it's sister *"S-9"*, by going along with the new E.I.A. proposal.

Taking away the 2 meter band from amateur use, would be a crime against the advancement of radio technology and experimental work.

All that can result from this proposal of E.I.A. is to, "Kill The Spirit of Radio Experimental Work."

Man is destroying enough, without going into the field of experimental spirit of radio. Don't look just at the present—look ahead—Don't help to destroy the field that made you—Let's help to clean up the frequency—rather than giving more frequencies to mess up.

Sorry—no signuter—service comes first.

Unsigned

The mind boggles! We have always liked to picture amateurs as serious, intelligent, informed individuals with a "show-me" attitude. But the rash of letters received in the past few weeks in reaction to the most blatant lying attack on the motives and integrity of *CQ* by W2NSD, publisher of *73 Magazine,* has us wondering if *any* of the letterwriters has had the common sense to verify Wayne Green's scandalously libelous charges before sitting down, crayon in hand.

The facts are as follows, and will be fully documented upon request:

On November 3, 1970, *CQ* received from the Electronics Industries Association a copy of a draft proposal rule making entitled, "Amendment of Part 95 and Part 15 of the Commission's Rules Concerning the Allocation and Assignment of Frequencies for Unlicensed Communications, Class D Citizens Radio Service and a New Proposed Class E Citizens Service." The draft proposal by W. I. Thomas, Chairman, Citizens Radio Section, EIA, described the channelized use of 1.25 mc of the 2-meter amateur band for CB use. The cover letter accompanying the draft stated, "If there are no substantive objections or changes to the attached, it will be filed as a petition of the Citizens Radio

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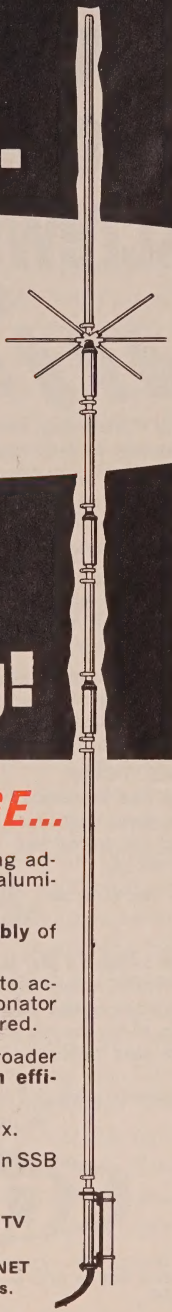

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Section of this Division.”

CQ's editoral reaction was crystal clear in its wording. The first available issue of *CQ* was January 1971, on sale November 28, 1970. Our editorial on page 5 stated, “It is without reservation that *CQ* goes on record as being vehemently opposed to the institution of any portion of any amateur band as an extention of the Citizen's Radio Service even on a shared basis.” We urge the letterwriters to go back to that issue and read our statements. They're fact, not fantasy as are W2NSD's diatribes.

Again, in February *CQ,* our editorial touched on the subject, and we re-iterated our stand against shared CB use of 2-meters. Again on page 5, under “EIA Proposal” we stated, “If we offended anyone at EIA by jumping with both feet on an idea before it was ready, we apologize, but we still think that the answer to the problems of the Citizens Band lie somewhere other than the amateur 2-meter band.”

As a direct result of CQ's strong editorial opposition to the EIA proposal, it was withdrawn from consideration. This, too can be documented!

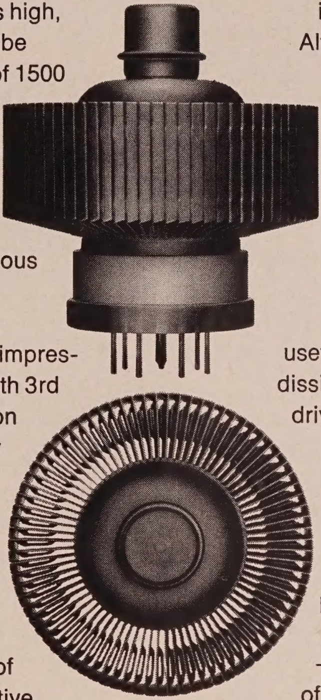
There's more to this story than just W2NSD's lies about *CQ's* participation in the 2-meter EIA proposal. There's the not-too-small matter of Mr. Green's efforts to change the amateur licensing structure and institute a code-free, examination-free sub-Novice license useable on the amateur 220 mc band. It's an interesting idea, proposing v.f.o. operation of f.m. equipment up to 100 watts throughout the middle 4 mc of the 220-225 mc band. The proposal was made in the August issue of Wayne Green's own CB magazine, *Radio Today,* now defunct. However he may present it to amateurs, no matter how he may try to make it appear as an ecumenical offering to the Citizens Radio Service by a high minded progressive amateur, there is no erasing the fact that four months before EIA proposed the subdivision of the 2-meter band, Wayne Green had proposed the sub-division of the 220 mc band, not for its potential benefit to amateurs, but for his own yellow journalistic motives. His own magazine belies the denial. The headline of the August 1970 issue of *Radio Today,* editor/publisher Wayne Green, reads “Proposed—RM-1633: Hundreds of New Channels for LEGAL Hobby Use . . . A CB Bonanza.” And by Wayne Green, W2NSD! Tsk, tsk!

In January 1971 the Citizens Radio Section of the EIA again drafted a proposal to FCC, this time proposing the *channelized* sub-division of the 222-224 mc portion of the amateur 1¼ meter band. We feel no different about the reallocation of any portion of any amateur band for non-amateur use now than we did when writing our January editorial. But frankly, if we knew that a change was imminent and it was our responsibility to decide between W2NSD's 220 mc proposal and EIA's, we'd be inclined to give the nod to EIA's version. The W2NSD proposal offers unrestricted use of 4 mc of the 5 mc wide band with powers up to 100 watts, freedom to use repeaters, etc. and calls the new licensees hams. The EIA proposal suggests highly regu-

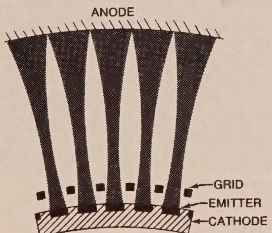
[*Continued on page 98*]

EIMAC's new 8877 high-mu triode delivers over 1500 watts output at 220 MHz. (2000 watts output at 30 MHz is easy)

On your right is the new, rugged, ceramic/metal 8877 high-mu power triode by EIMAC. Another state-of-the-art tube. Only three and one-half inches high, this low-profile, heavy-duty tube has a plate dissipation rating of 1500 watts, a maximum plate voltage rating of 4000 and a maximum plate current rating of one ampere. In the HF region, typically, the 8877 coasts along at a continuous duty level of 3500 watts PEP input. A peak drive signal of only 65 watts is required. This impressive power gain is achieved with 3rd order intermodulation distortion products −38 decibels below one tone of a two equal-tone drive signal.



This magnificent power triode is rated at full input to 250 MHz. The low impedance grid structure is terminated in a contact ring about the base of the tube, permitting very effective intrastage isolation to be achieved up to the outer frequency limit of operation. The close tolerance grid, moreover, is composed of aligned, rectangular bars to achieve maximum grid dissipation and controlled transconductance. This aligned grid, plus the EIMAC segmented, self-focusing cathode provide low grid interception and the low grid drive requirement; both of paramount importance in the VHF region.



Parallel electron "guns" provide electron focusing, low intermodulation distortion, and low grid interception.

Although primarily designed for superlative linear amplifier service demanding low intermodulation distortion, the 8877's high efficiency permits effective operation as a class C power amplifier or oscillator, or as a plate modulated amplifier. The zero bias characteristic is useful for these services, as plate dissipation is held to a safe level if drive power fails, up to an anode potential of 3 kV.

The sophisticated circuit connoisseur will appreciate the many advantages of this newly developed power tube. Write for detailed information. And remember—the 8877 is another example of EIMAC's ability to provide tomorrow's power tube today. For additional information on this or other products, contact EIMAC, 301 Industrial Way, San Carlos, California 94070. Phone (415) 592-1221 (or call the nearest Varian/EIMAC Electron Tube and Device Group Sales Office.)

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Announcements

Boy Scouts of America

The Boy Scouts of America are participating in a year long ecology/conservation project called Project SOAR—Save Our American Resources. Cubs, Scouts and Explorers are planning many projects to keep our nation "green." June 5, is set aside as Scouting Keep America Beautiful Day, and Scout hams will be participating in a SOAR Jamboree-on-the-Air, to begin 1400 GMT Saturday June 5, and end 0200 GMT Sunday, June 6.

Purpose of the SOAR JOTA is to exchange ideas and plans about unit, district and council conservation good turns. Cubs, Scouts, Explorers, and Scouters have been informed they can get help from local amateurs in getting their projects discussed on the air.

Here are the approximate frequencies in kc that will be used during the SOAR JOTA: 80/75-meter band: c.w.-3,590, phone-3,940; 40-meter band: c.w.-7,030, phone-7,290; 20-meter band: c.w.-14,070, phone-14,290; 15-meter band: c.w.-21,140, phone-21,360; 10-meter band: c.w.-28,190, phone-28,990.

No reports are required; no special QSL's or certificates; just a good turn to Scouting.

K2BFW, at Scout headquarters, North Brunswick, N.J., net control for the B.S.A. national net, will be monitoring the frequencies listed.

John Gore Memorial Scholarship

The Foundation for Amateur Radio, Inc., a non-profit organization, with its headquarters in Washington, D.C., announces its intent to make the annual award of the John Gore Memorial Scholarship for either graduate or undergraduate study. The Scholarship pays $500 for the academic year. Upon re-application, it is subject to being renewed for succeeding years.

Licensed radio amateurs who intend making a career in electronics or related sciences may now request the application for the academic year 1970-1971. Requests should be addressed to the Chairman, Scholarship Committee, 8101 Hampden Lane, Bethesda, Maryland, 20014. Requests for applications must be postmarked prior to May 31, 1971.

To be eligible for the award, applicants must have completed at least one year in an accredited college or university and must be enrolled in a course of studies leading to a degree. They must also be radio amateurs holding a valid FCC license of at least a general class level. All things being substantially equal, preference will be shown to applicants from the area served by the Foundation—the District of Columbia, Maryland and Northern Virginia; however, applicants wherever resident are eligible.

The Foundation is devoted exclusively to promoting the interests of amateur radio and to those scientific, literary and educational pursuits that serve to advance the purposes of amateur radio.

John W. Gore, in whose honor the Scholarship is named, was until his death in 1960, the President of the Foundation. A prominent radio amateur for many years, he was a Vice-President of the Bethlehem Shipbuilding Corporation in Baltimore, Maryland.

Geneva, Switzerland

1971 is marked by two events of importance in the field of telecommunications:

1. The World Administrative Radio Conference for Space Telecommunications (Geneva, June /July 1971) one of the most important conferences in the history of telecommunications, organized by the International Telecommunication Union (ITU). The International Telecommunication Union is the specialized agency of the United Nations for telecommunications. It has 139 Member countries. Its headquarters are in Geneva.
2. TELECOM 71, the first world telecommunication exhibition covering all fields of telecommunications, including broadcasting, television, electronics, data transmission, audio-visual media and related fields, also organized by the ITU, which will take place from 17 to 27 June 1971.

The Conference and TELECOM 71 will be held in the same premises – the well-known Geneva Exhibition Halls. For more information write to: ITU, Secretariat, 16, Quai de L'Ecole-de-Médecine, Geneva, Switzerland.

Birmingham, Alabama

The Birminghamfest this year will be on May 2 at the Armory on Oporto Avenue (just off U.S. 78 East—near Eastwood Mall). For entertainment, prizes, contests, net meetings, eyeball QSO's and fun for the entire family, plan to attend. For further information contact the Birmingham Amateur Radio Club – W4CUE, P.O. Box 603, Birmingham, Alabama 35201.

Milwaukee, Wisconsin

On Saturday, May 15, WA9DZL, the amateur radio station of the 128th Air Refueling Group (TAC), Wisconsin Air National Guard will again operate in conjunction with the annual Armed Forces Day. They will issue a commemorative certificate to all those contacting WA9DZL. Operating schedule is as follows: 14.295 mc ±5 kc, 1300-2100 GMT, 7.280 mc ±5 kc, 1300-1730 GMT, 28.780 mc ±5 kc, 1300-2100 GMT. They will monitor 146.94 f.m. from 1300-2100 GMT.

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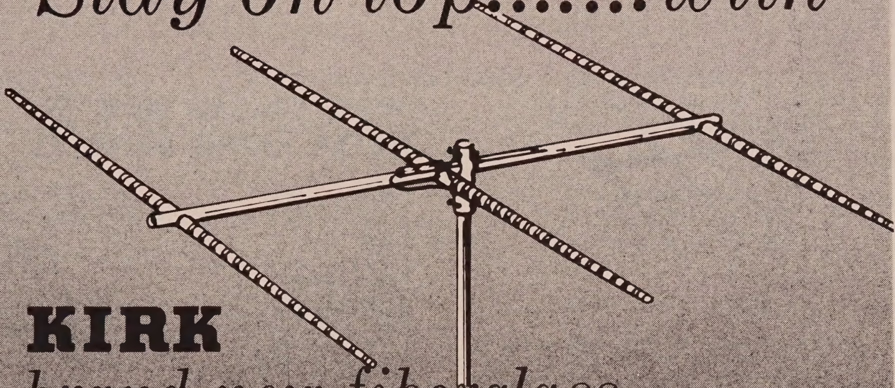

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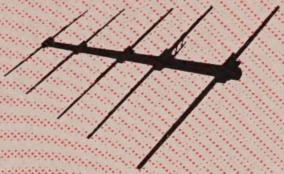

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All W7GVA mono bander beam elements are constructed of the finest aluminum available 6063T832 top quality alloy. All tubing is seamless extruded hardrawn.

All Wilson Electronics mono bander beams have a 3" OD boom made of top grade seamless aluminum 6063-T6 alloy.

A 20 meter element consists of a 12 ft. section of 1 1/8" OD .058 wall center section, two 6 ft. pieces of 1" OD .049 wall middle section, and two 6 ft. pieces of 7/8" OD .049 wall end sections. Reflectors have two additional 2 ft. end sections of ¾" OD .035 wall.

15 meter element are the same except for the 7/8" OD end sections.

All our mono bander beams have a boom to mast plate of ¼" thick aluminum secured to the boom and mast with full circle clamps. All booms 30 ft. or more use two sections of boom secured with a heavy wall boom coupler, the boom can be tilted on booms 30 ft. or longer.

Our element to boom clamps are constructed of thick wall aluminum angles. With our unique clamps there are no holes drilled in the element. All hardware is cadmium plated.

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WIND LOAD (80MPH)	305 LBS.
WIND SURVIVAL	100 MPH
TURNING RADIUS	26.5 FT.
NET WEIGHT ASSEMBLED	85 LBS.

4 ELEMENT 20 METER BEAM
$119.95

GAIN	10DB
FRONT TO BACK RATIO	28DB
BOOM LENGTH	30 FT.
WIND SURFACE AREA	12.5 SQ. FT
WIND LOAD (80 MPH)	245 LBS.
WIND SURVIVAL	100 MPH
TURNING RADIUS	25 FT.
NET WEIGHT ASSEMBLED	62 LBS.

3 ELEMENT 20 METER BEAM
$69.95

GAIN	8.5DB
FRONT TO BACK RATIO	25DB
BOOM LENGTH	20 FT.
WIND SURFACE AREA	9.3 SQ. FT.
WIND SURVIVAL	100 MPH
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NET WEIGHT ASSEMBLED	41 LBS.

6 ELEMENT 15 METER BEAM
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FRONT TO BACK RATIO	28 DB
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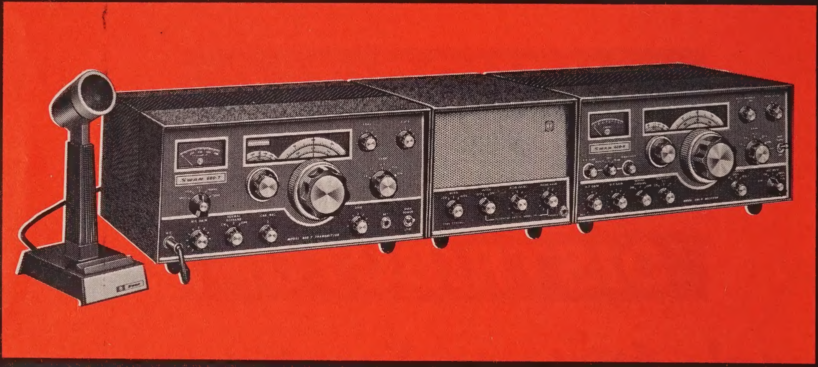

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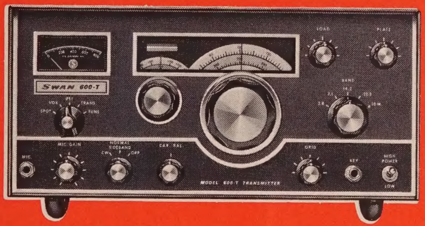
MODEL 600-R

The finest amateur band receiver and transmitter units available. These units combine all of Swan's proven engineering and craftsmanship, and include all the deluxe Swan features that have made Swan transceivers the largest selling transceivers in the world.



MODEL 600-T

Examine the list of features and specifications, and compare them with those of any other receiver and transmitter units on the market... then compare the prices. The amateur radio operator now has a new standard of performance, quality, reliability and value in transmitters and receivers.

The Swan 600T Transmitter and 600R Receiver!

SWAN
ELECTRONICS
A Subsidiary of Cubic Corporation

EASTERN OFFICE
P.O. Box 151
Freehold, N.J. 07728

FACTORY
305 Airport Road
Oceanside, CA. 92054

600-R SPECIFICATIONS:

- SSB, CW, AM and FSK superheterodyne receiver.
- Freq. Range: In addition to full coverage of 10, 15, 20, 40 and 80 meters, continuous coverage from 3 to 30 mc may be provided with an external oscillator, either tunable or crystal controlled.
- Ultra-smooth vernier tuning, with large knob and dial. The incomparable feel of the Swan tuning system.
- Sensitivity: ¼ microvolt at 50 ohms for 10 db signal plus noise-to-noise ratio.
- Selectivity: 2.7 Kc bandwidth with 1.7 shape factor is standard. Options include 0.5 Kc CW filter, 4 Kc AM filter, and SS-16 super selective filter.
- Crystal Calibrator with 25 and 100 kc selection.
- Hybrid Design: 7 tubes, 8 transistors, 12 diodes. Transistors used where they provide definite advantage. Tubes used where they still provide superior performance.
- Features Swan's exclusive Single Conversion design, with fewer spurious responses than multi-conversion designs.
- Fully compatible with 600-T transmitter, providing for transceive operation as well as separate frequency control. Also, CW sidetone, and genuine CW break-in operation.
- Built-in AC power supply.
- Dimensions:
  15 in. wide, 6½ in. high, 12 in deep.

$395*

600-T SPECIFICATIONS:

- Freq. Range: Full coverage of 10, 15, 20, 40 and 80 meters. Extended frequency coverage for MARS operation with plug-in crystal oscillator accessory, Model 510X.
- Power Rating: 600 watts P.E.P. input. 500 watts CW, 150 watts AM. 100 watts continuous AFSK.
- Pi-Network output for 50 or 75 ohm coax.
- Suppression: Carrier 60 db, unwanted sideband 50 db. Third order distortion approx. 30 db.
- Audio response: Plus or minus 3 db from 300 to 3000 cycles.
- CW Keying: Grid block circuit, Full Break-in system. Includes sidetone to receiver.
- VOX accessory, plug-in.
- Internal AC Power Supply.
- Dimensions:
  15 in. wide, 6½ in. high, 12 in. deep.

$495*

600-R ACCESSORIES:

Speaker in matching cabinet	**$18***
I.F. Noise Blanker. Installs internally	**$79***
Adjustable Audio Notcher. Installs internally	**$44***

*Factory price

270B SPECIFICATIONS

- Power Input: 260 watts P.E.P. SSB and 180 watts CW
- Frequency Range: 3.5-4.0 mHz, 7.0-7.3 mHz, 21.0-21.45 mHz, 28.0-29.7 mHz.
- C.F. Networks: Crystal Lattice Filter. Same as used in the Swan 500CX 2.7 kc with 1.7 to 1 shape factor. Ultimate rejection exceeds 100 db.
- Unwanted sideband suppressed 50 db.
- Carrier suppressed 60 db. 3rd order distortion down approx. 30 db.
- Audio Response: flat within 3 db from 300 to 3000 cycles in both transmit and receive modes.
- Pi Antenna Coupler for 50 to 75 ohm coaxial cable.
- Grid block CW keying with off-set transmit frequency.
- Solid state VFO circuit temperature and voltage stabilized.
- Receiver sensitivity better than ½ microvolt at 50 ohms for 10db S+N/N ratio.
- 100 kc Crystal Calibrator and dial-set control.
- S-meter for receive, P.A. Cathode meter for transmitter tuning.
- Improved AGC and ALC circuit. Separate RF and AF gain controls.
- Sideband selector.
- Provision for plug in of VOX unit, external VFO, headphones, and Cygnet linear.
- Tube Complement: 12AU6 VFO amp., 12BE6 trans. mixer, 6GK6 driver, 6LQ6 pwr. amp., 6BZ6 rec. R.F., 12BE6 rec. mixer, 12BA6 1st I.F. amp., 12BA6 2nd I.F. amp., 12AX7 prod. det. A.F. amp., 6AQ5 A.F. output, 12AX7 mic. amp., 6JH8 bal. mod., 12AV6 AGC-ALC amp., 12BA6 xtal cal.
- Voltage Input: 117 volts, 50-60 Hz. Available on special order for 208-220-240 volts.
- For 12-14 volts DC operation, a plug-in converter, model 14-A, is available. This unit is only 1½ x 3 x 4 in., and plugs into the back of the 270B in place of the AC power connector.
- Dimensions: 5½ in. high, 13 in. wide, 11 in. deep. Net weight: 24 lbs.

SWAN amateur are the most

deluxe *Cygnet* 270B

SSB TRANSCEIVER
5 BANDS—260 WATTS
WITH BUILT-IN AC POWER SUPPLY AND LOUDSPEAKER

The deluxe Cygnet is a complete amateur radio station beautifully integrated into one package. It contains all the features required for home station operation with enough power to work the world. Its surprising low cost is a result of our continuing program of value engineering.

The lightweight, compact design of the Deluxe Cygnet makes it an ideal traveling companion. You can take it with you on your vacation or business trip, and operate from your motel room, summer cabin, boat or car. All you do is connect to an AC power source, plug in your microphone, and antenna—you're on the air. Twelve volt DC operation may be obtained by using the optional plug-in accessory, Model 14A DC converter.

The Swan Deluxe Cygnet is the most versatile and portable transceiver on the market, and certainly the best possible value. $399*

Model 14A DC Converter
Shown in rear view above.................. $29*

*Factory price

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Freehold, N.J. 07728

FACTORY
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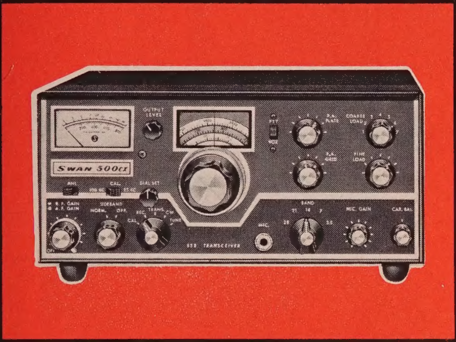
transceivers popular in the world



model 500CX

550 WATT 5 BAND SSB-CW-AM TRANSCEIVER

All Swan transceivers feature the successful application of a unique combination of a high frequency IF system and a multi-range VFO, which results in greatly reduced image and spurious response . . . Remember . . . The only thing better than single conversion is no conversion at all.

Selectivity . . . Second to none . . . by utilizing a 5.5 Mc filter with a 2.7 kc bandwidth, Swan transceivers provide optimum shape factor, steepest skirts and greater ultimate rejection than is possible in the more commonly used 9.0 Mc filters. Swan transceivers both transmit and receive audio which is virtually flat from 300 to 3000 cycles, which results in truly natural sounding voice quality. Furthermore, independent researchers have proven time and again that a 2.7 kc bandwidth provides maximum intelligence under heavy noise and QRM conditions.

Sensitivity . . . Second to none . . . Use of the best vacuum tubes available for the R.F. amplifier results in signal to noise ratio and overload characteristics without the overload problems found in solid state receivers. The AGC system employed in the 500CX further reduces cross modulation and front end overload to extremely low levels.

Smooth Tuning . . . The Velvet Tuning dual-ratio planetary dial drive in the 500CX is without question the smoothest system you'll find.

$449*

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A Subsidiary of Cubic Corporation

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P.O. Box 151
Freehold, N.J. 07728

FACTORY
305 Airport Road
Oceanside, CA 92054

500CX SPECIFICATIONS

SPECIAL FEATURES:

- New amplified Automatic Gain Control circuit.
- Amplified Automatic Level Control.
- Solid state crystal calibrator provides markers every 25 kc or 100 kc.
- New Product Detector circuit reduces distortion products and provides greater audio power output.
- Improved sidetone oscillator for CW monitoring.

GENERAL SPECIFICATIONS:

- Frequency range: 3.5-4.0 Mc, 14.0-14.45 Mc, 21.0-21.45 Mc, 28.0-29.7 Mc
- Extended frequency coverage for MARS operation.
- 5.5 Mc quartz crystal filter. Finest in the industry. 2.7 kc bandwidth, 1.7 to 1 shape factor at 6 and 60 db more than 100 db ultimate rejection.
- Selectable Upper and Lower Sideband
- Solid state VFO, highest stability, temperature and voltage compensated.
- 13 vacuum tubes, 7 transistors, 11 diodes.

TRANSMITTER SPECIFICATIONS:

- Power Rating: 550 watts, P.E.P. Input, 360 watts CW input, 125 watts AM.
- Suppression: Unwanted sideband down more than 50 db, carrier down more than 60 db, third order distortion down approximately 30 db.
- Audio Bandpass: 300 to 3000 cycle.
- Output Circuit: Wide range Pi.
- Amplified ALC, increased voice power.
- Automatic voice controlled transmit with plug-in VX-2 accessory.
- CW keying, grid-block system.
- Break-in CW operation with plug-in VX-2 accessory.

RECEIVER SPECIFICATIONS:

- Sensitivity: Requires less than ½ microvolt at 50 ohms for 10db S+N/N ratio.
- Precision Tuning: Velvet smooth, dual ratio, zero backlash.
- Audio fidelity: 300 to 3000 cycle.
- Amplified AGC.
- S-Meter circuit.
- Automatic Noise Limiter.
- CW Sidetone circuit.

POWER SUPPLY REQUIREMENTS:

- For 117 volts, 50-60 cycle: Swan model 117-XC, includes speaker.
- For 117-230 volts, 50-60 cycle: Swan model 230-XC, includes speaker.
- For 12-14 volts DC: Swan model 14-117. (Also operates on 117 volts AC.)
- For 12-14 volts DC: Swan model 14-230. (Also operates on 117-230 volts AC.)

SWAN'S HIGH EFFICIENCY mobile antennas

Mobile antenna radiation efficiency is directly proportional to the Q of the loading coil. Q is determined mostly by the diameter of the coil, pitch of the winding, and the wire size used. Compare the Swan Hi-Q coil with any on the market, and discover the difference. Our coil is of such high quality and Q that we even cover them with a transparent shield for all to see. If your transceiver is tired of heating a low Q coil, buy a Swantenna, and radiate instead.

SINGLE BAND MODEL 35

For maximum radiation efficiency, our single band design is the best. If you're a one-band operator, or don't change bands very often, this is the model for you. Heavy duty construction is of the highest possible quality. Stainless steel whip has Kwik-On connector, also for easy removal and stowage. Power rating is 2000 watts P.E.P.! Heavy duty base sections of various lengths permit choice of deck or bumper mounting.

Top section, 5 ft. Whip	11.95*	75 Meter Coil	27.95*
15 Meter Coil	21.95*	18 inch Base Section	8.50*
20 Meter Coil	23.95*	36 inch Base Section	8.95*
40 Meter Coil	25.95*	48 inch Base Section	9.50*

Prices include Kwik-On Connectors

5-BAND MANUAL SWITCHING MODEL 45

No coil changing with this model, it covers 10, 15, 20, 40 and 75 meters. Gold plated contacts on the patented* vertical switch provide 5 stops for full coverage of the 75 meter phone band. High radiation efficiency is provided by the high Q coil, (same as the single band coils). 1000 watts P.E.P. power rating. 5 foot whip comes with Kwik-On connector.
Top quality throughout. $69*

5-BAND REMOTE CONTROL MODEL 55B

This is our most deluxe model, for the band hopping operator. A control box under the dash permits instant band changing while driving. Covers 10, 15, 20, 40 and 75 meters with the same patented* electrical and mechanical design as the manual model 45, but with motor drive and remote control. Finest quality construction, nothing has been spared to make this model the very best, and most efficient you can buy. Power rating is 1000 watts P.E.P. 5 foot whip comes with Kwik-On connector. $99*

*Patent No. 2961657

Deluxe Bumper Mount $24*

Extra KWIK-ON Connectors
For quick removal of model 45 or 55.
All stainless steel construction $6*

NO COMPROMISE ON PERFORMANCE WITH SWAN'S NEW

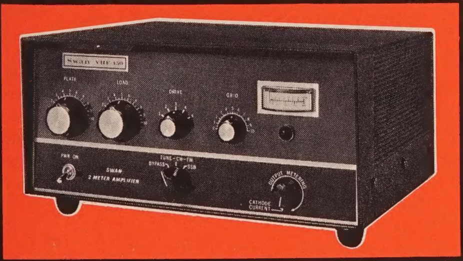
two meter FM transceiver

MODEL FM-2X

VHF FM TRANSCEIVER
FOR 2 METERS
NO COMPROMISE 2 METER PERFORMANCE.

The all new Swan FM-2X has been a long time in the making, but we wanted to offer you the finest in performance and quality at a price all can afford. The Swan FM-2X features all solid state construction (no final tubes to waste battery power), and comes complete with microphone, AC power supply and mobile mounting bracket. The FM-2X is being built to our specifications by a highly respected Japanese manufacturer of commercial communications equipment. Needless to say, the FM-2X is backed by the famous Swan service policy.

$229*



MODEL VHF150

2 METER FM AMPLIFIER

Here in one complete package is a 150 watt self-contained amplifier. Use for home station, or with the addition of the Swan 14C DC converter, the unit may be used in mobile operation to greatly extend the range of direct communications.

$249*

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P.O. Box 151
Freehold, N.J. 07728

FACTORY
305 Airport Road
Oceanside, CA 92054

MODEL FM-2X SPECIFICATIONS:

General
- Frequency Coverage: 144-148 MHz
- Number of Channels:
  12 Channels, 2 supplied.
  Channel 2
  Receive 146.94 MHz
  Transmit 146.93 MHz
  Channel 1
  Simplex 146.94 MHz
- Modulation: Frequency Modulation
- Transmitter Control: Push to talk
- Power Source:
  AC: 117 volts 50/60 Hz
  DC: 13.5 volts ±10%
- Dimensions: 8¼" x 7" x 3"
- Weight: 8¼ lbs.
- Standard Accessories:
  Dynamic Microphone, Antenna, Connector Plug. AC/DC Cord.

Transmitter
- FULLY SOLID STATE, NO TUBES.
- RF Output Power: 10 watts minimum.
- Frequency Deviations:
  15 KHz maximum
- Frequency Stability: ±.001% or less.
- Spuriour Radiation:
  Greater than −60 db below Carrier.
- Frequency Multiplication: 12

Receiver
- Receiver Circuit:
  Crystal-controlled Double Conversion Superheterodyne.
- Intermediate Frequencies:
  1st 10.7 MHz, 2nd 455 kHz.
- Input Impedance: 50 to 75 Ohms.
- Sensitivity 0.5 μV for 20 db quieting.
  .5 μV for 12 db SINAD.
- Intermodulation: Greater than 60 db.
- Audio Output:
  2 watts to internal speaker.

MODEL VHF150 SPECIFICATIONS:

- Power Rating: 180 watts P.E.P. input SSB.
  150 watts DC input on CW or FM.
- Frequency Range: 143-149 mc. Uses 5894B twin tetrode.
- Drive Requirements: Approx. 2 watts for full output.
- Meter Selector: Reads plate current and relative output. Includes transmit and receive relay control for simple operation with a transceiver. Pi coupling adjusted at factory for 50 ohms.
- Power Supply
  Built-in 117 or 230 VAC input with proper line cord. Also DC operation with addition of 14 C2 DC module.
- Dimensions: 13 in. wide x 5¾ in. high x 10¾ in. deep.
- Weight: 23 pounds.

*Factory price

Everything you've always wanted to know about Slow Scan amateur television

Do I need a special license, or any unusual technical knowledge to operate SSTV?

No. Any licensed amateur operator can easily set up and operate an SSTV station, (you even tune your Robot Slow Scan equipment the same way you tune for voice). The impression that SSTV required advanced technical knowledge was due to the fact, that until now, amateurs operating SSTV had to build their own sets.

What kind of radio equipment is required for SSTV?

The SSB or VHF/UHF radio set and antenna you now use for phone contacts are all that are required. To install the Robot Monitor, simply plug in the cord, furnished with the monitor, into the earphone jack on your receiver.

To install the Robot Camera, plug the cord furnished with the camera into the microphone jack. The station microphone then plugs into the Robot slow scan set.

On what bands is SSTV authorized?

The FCC has authorized SSTV operation on all phone bands except 160 meters, and the General Class portion of the phone band on 80, 40, 20 and 15 meters. With the exception of the General Class portion, a licensed amateur can operate SSTV on the same frequencies he operates phone.

Presently, slow scan activity can be frequently found on 3845 KHz, 14230, 21340 and 26800 KHz. Call-ins with or without SSTV gear are welcome, and you'll find that slow scanners are happy to answer any questions you may have.

ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, California 92111

How many SSTV stations are now on the air?

We're not sure of the exact number, but it is substantial, and growing very rapidly. Slow scanners are among the most active group of amateurs on the air. They are located in the United States and practically all continents. The DX capability of SSTV is being demonstrated daily by picture exchange between US and foreign amateurs.

Can I record SSTV pictures?

Yes. An inexpensive *audio* tape recorder running at 3¾ IPS is more than adequate. Present SSTV stations practice includes use of tape for preserving off-the-air contacts as well as preparing an interesting program to be transmitted.

How much does the Robot slow scan television equipment cost, and where can I obtain it?

The Robot Model 80 Camera and Model 70 Monitor cost $395 each, and the f1.9 lens is $30. You can purchase the Robot equipment direct from our factory. Mail in the coupon below, and we will send you complete information on our equipment, and how it may be purchased.

See us at the Dayton "Hamvention."

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, California 92111

Gentlemen:
Please send me your complete information on the Robot camera and monitor.

Name____________________

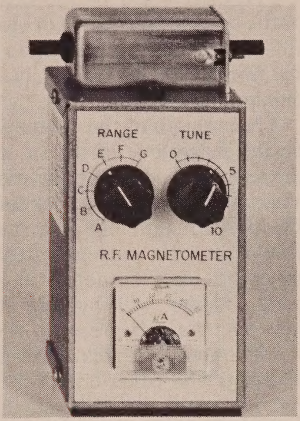
Street____________________

City____________________

State__________ Zip__________

Call____________________

An R.F. Magnetometer and Field Strength Meter



Part II (Conclusion)

BY WILFRED M. SCHERER,* W2AEF

Last month's article introduced a new piece of test equipment to amateurs, and described the instrument's operation and construction. This month, we will examine the many applications of the R.F. Magnetometer to antenna and feedline work, shielding leaks, tracing potentially interfering r.f. on unrelated conductors, and other useful jobs.

BEFORE delving into the actual use of the R.F. Magnetometer and Field Strength Meter, a description of its operation and characteristics is in order.

The R.F. Magnetometer is similar in operation to a conventional absorption-type wavemeter, but with the pickup inductor electrostatically shielded to eliminate coupling and permitting only inductive coupling to the r.f. source. The pickup inductor is wound on a ferrite rod to ensure a very high Q and provide a sensitive inductive-pickup element.

A diode detector is lightly coupled to the tuned circuit to minimize circuit loading and maintain the high circuit *Q*.

Operation

Maximum pickup of the magnetic r.f. field is obtained when the slot of the Magnetometer shield (or the long side of the shield) is in line with the plane of the field or at a right-angle to the conductor producing the field as shown at fig. 4.

A *null* in the Magnetometer reading is produced when the shield slot is at right-angles to the field or in line with the field-producing conductor.

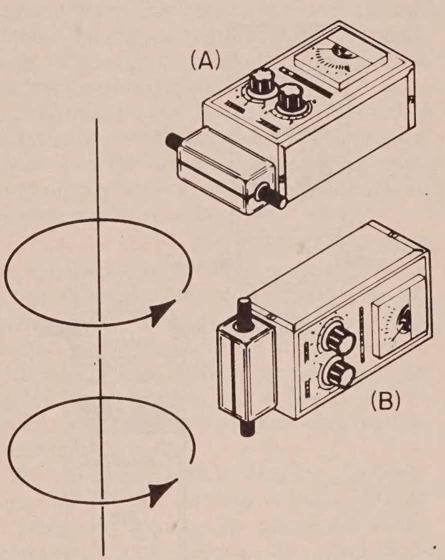


Fig. 4—Orientation of the R.F. Magnetometer for r.f. pickup from a conductor. (A) Maximum reading is obtained when shield slot is in line with magnetic field or at 90° to the conductors. (B) A minimum or null indication is obtained when the shield slot is parallel with the conductor or at 90° to the magnetic field.

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*Technical Director, *CQ*.

The orientation of the field or the plane of the conductor (when not visible) will therefore be indicated according to the position of the Magnetometer slot or shield required for maximum pickup.

The strength of the magnetic field depends on the magnitude of the r.f. current flowing through the conductor. By moving the Magnetometer along the conductor with the shield slot maintained at a right-angle to the conductor, the current distribution on the conductor may be noted, in which case the meter reading will increase at the high-current points and decrease at the low ones.

Maximum field pickup from an inductor is obtained with either end of the ferrite pickup rod placed at the end and in line with the inductor as shown at fig. 5. The shield slot also may be placed alongside and parallel to the plane of the inductor, but slightly less sensitivity may be realized.

Note that there is no specific sensitivity control. This function, however, may be handled by detuning the resonant circuit or by varying the distance between the pickup element and the circuit under test.

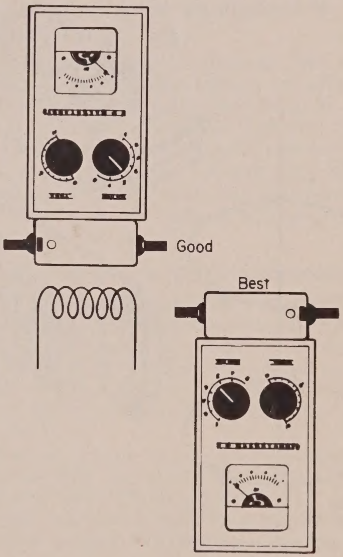

Fig. 5—Maximum pickup from an inductor is obtained when one end of the ferrite rod is placed adjacent to one end of the inductor. Somewhat less, but still satisfactory pickup will be realized when the pickup inductor is placed parallel to the inductor under test.

Applications

Antennas: The distance at which the Magnetometer must be located from an antenna will depend on the transmitting power, antenna efficiency, antenna-current distribution and the frequency.

The sensitivity of the instrument drops off somewhat above 20 mc and in any event is quite a bit less than that of the usual field-strength meter equipped with a pickup antenna. It thus must be placed relatively close to the radiating system. This does, however, provide an advantage in that the nearness of the device makes observations easier while antenna adjustments are made. In addition, body movements within the radiated field have less effect on readings than will occur with readings on an f.s. meter.

The main point to keep in mind is that the Magnetometer must be positioned so that its slot is at a right-angle or 90 degrees to the plane of the radiating element or to the direction in which it runs as shown at fig. 6.

When used at the sides of a horizontal antenna, the Magnetometer slot should be vertical. As the instrument is brought in beneath the antenna, the instrument should be gradually tilted, until when directly under the antenna, the slot is facing upward, but still at a right-angle to the antenna direction as shown at fig. 6.

In order to make it easier to observe the instrument meter, the Magnetometer may be turned accordingly, as long as the slot (or shield) is maintained at a right-angle to the radiating element.

Where a beam, such as a Yagi, is involved, the Magnetometer should be placed in front of the array for determining the forward

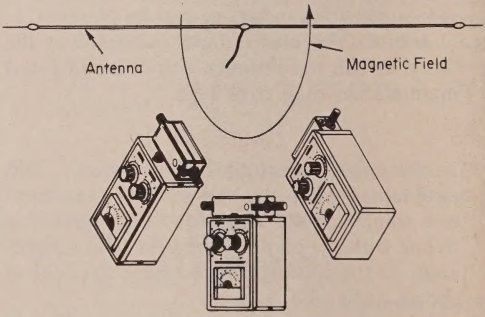

Fig. 6—For measuring relative field intensity from an antenna, or an element of an antenna, the slot of the R.F. Magnetometer must be maintained at right angles to the antenna regardless of its location with respect to the ground.

radiation, while determination of the front-to-back ratio requires readings to be taken directly at the front and rear of the system.[4]

The performance of other beams, such as the Quad, Lazy-H, etc., is best observed with the Magnetometer centered in the expected path of the beam.

Supporting the instrument on a pole, suspending it from a tree or on a clothesline is a good means of placing the device at a desired fixed location in relation to the antenna.

Use with other antennas should be conducted in accordance with the foregoing principles of orientation in relation to the radiating elements.

Antenna-Polarization: The polarization of the antenna field usually may be known according to the orientation of the radiating elements. Where this cannot be seen with "odd-ball" antennas, the polarization may be determined according to the orientation of the Magnetometer that is required for a maximum reading at a given location for the instrument. Where this necessitates the Magnetometer slot to be positioned horizontally in relation to the earth, the radiated field is vertically-polarized. A vertical-positioned slot indicates horizontal polarization.

Antenna-Current Distribution: Current distribution on an antenna may be found by moving the R.F. Magnetometer along the antenna with the instrument maintained at a given distance and oriented as described earlier. A distance of 2-6 feet usually is best, but where the antenna is out of reach by hand, the Magnetometer may be attached to a long pole held by hand in order to allow its use near the proximity of the antenna. On the other hand, where a fairly high transmitter power is in use and where the antenna is 20-30 feet or so above ground, simply walking under the antenna with the instrument held high with an outstretched arm will suffice.

In the case of a beam, such as a Yagi or Quad, the current distribution is best observed with the instrument held within a few feet of the involved element.

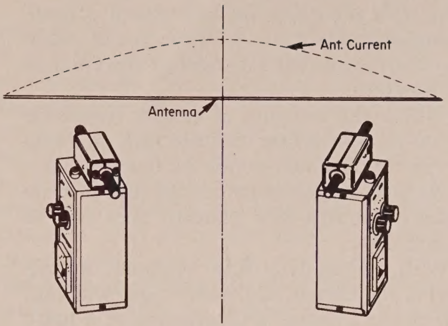

Fig. 7—Some slight unbalance exists in the R.F. Magnetometer in its present configuration, which can lead to slightly erroneous readings under certain circumstances such as measuring current distribution along a dipole antenna. The effect can be minimized by rotating the instrument 180° as the center of the antenna is passed, as shown here.

Where the current distribution or the balance either side of the center of the antenna (or high-current point) is the same, the Magnetometer itself may show a slight unbalance. This is due to an unbalanced condition of the pickup inductor, one side of which is grounded to the case.

This situation can be rectified by rotating the instrument 180 degrees on its axis as it is passed by the center of the antenna when the Magnetometer is moved from one side to the other as shown at fig. 7.

Transmission Lines: The magnetic field from a transmission line or the presence of r.f. on a coax shield may be determined with the Magnetometer moved along the line and oriented with the shield slot at a right-angle to the line. Where such fields exist, the high- and low-current points will be found according to the operating frequency and the distance from the load.

The advantage gained by using the Magnetometer for this purpose is that any such r.f. fields may be definitely pinpointed to the transmission line; whereas, the usual field-strength meter, equipped with a pickup antenna, may introduce erroneous indications due to r.f. pickup from the transmitting antenna itself, rather than that from just the line.

Comparison of the magnetic field reading along the line, before and after a balun is installed at the antenna, will indicate how effectively the balun has eliminated or minimized antenna currents on the line or radiation therefrom that may distort the antenna field pattern.

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[4] The meter is not calibrated in db ratios, since the linearity of the diode detector at the low levels involved varies with frequency. At the lower frequencies doubling or halving the meter reading indicates a change of about 6 db, while at the higher frequencies the change is about 3 db. Where relative db ratios are desired, a calibration chart may be made for each band. This can be done by monitoring the transmitter output with a wattmeter and noting the change of the Magnetometer reading (while an r.f. field is picked up) when that power is doubled or halved, indicating a 3 db change.

Where the antenna is readily accessible for current-distortion readings with the Magnetometer, whether or not the balun has improved the current balance (and thus provide a more uniform field pattern) may also be determined.

With certain type trap antennas, knowledge of the current distribution also will indicate if the antenna is functioning as a half-, full-, or other-wavelength antenna.

Ground Leads and Other Conductors: Leads for grounding transmitting equipment often carry r.f. currents that may cause radiation or ineffectively ground the gear for r.f. Such conditions also may introduce RFI such as TXI. Just how "cold" such connecting leads are may be determined using the Magnetometer along the lead as described for transmission lines.

Potential causes of interference due to r.f. on building wiring also may be similarly detected. Where r.f. is present on hidden wiring, the wiring may be traced using the Magnetometer which also will indicate the direction or plane of the wiring according to the orientation of the instrument slot.

One of our experiences in this respect was TXI caused by r.f. induced into hidden building wiring (located near the end of a long-wire antenna) as detected by the Magnetometer. Re-locating the end of the antenna from this area cured the situation.

Re-radiating from Other Elements: R.f. pickup and re-radiation with metal elements in the vicinity of an antenna may be found using the Magnetometer at such conductors. As noted earlier, these may be metal fencing, railing, gutters, drain pipes, flagpoles, towers, guy wires, etc. For this application, the Magnetometer is used as with transmission lines.

During our work with the Magnetometer an interesting situation in this regard was encountered where the 14 mc radiation in a desired direction from a multiple-dipole antenna was very poor. Searching with the Magnetometer revealed a strong r.f. magnetic field emanating from a nearby v.h.f.-antenna mast located in the desired-radiating direction from the antenna. This mast effectively was a grounded quarter-wave antenna at 14 mc. The radiation therefrom, due to induced r.f. from the transmitting antenna, distorted the field pattern, as evidenced by a restoration of the signal in the desired direction when the mast was subsequently removed.

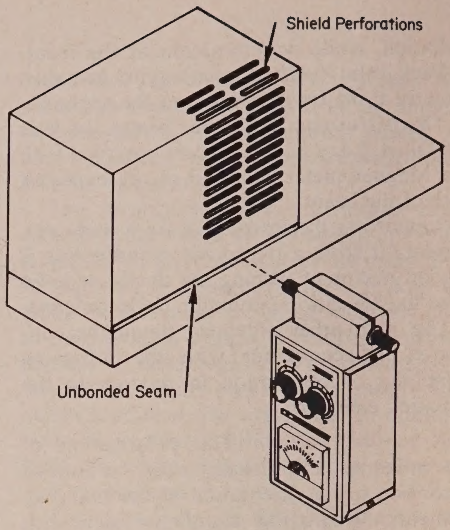

Fig. 8—The effectiveness of r.f. shielding may be evaluated using the R.F. Magnetometer by using the end of the ferrite rod as a probe to locate the precise source of r.f. leakage. The frequency of such radiation may also be determined by the R.F. Magnetometer. In some situations of intense radiation, it may be necessary to detune the Magnetometer to reduce its sensitivity permitting closer pin-pointing of the offending r.f. leak.

Effectiveness of Shielding: The effectiveness of r.f. shielding may be determined using the R.F. Magnetometer as a probe. This is done by orienting the instrument with the end of the ferrite pickup rod directed at the point to be examined as shown at fig. 8.

By moving the device about the area, r.f. radiation from holes, seams or other shield openings may be detected. Such leakage may be found not only at the fundamental operating frequency, but also at harmonics, since these may be individually detected and singled out by the Magnetometer according to the frequency to which it is tuned.

Among our experiences in this area was harmonic radiation from a number of exciters (that caused TVI) found along the bottom edge of the rear panel of the p.a. enclosure where no means had been provided to secure the shield to the chassis over its length. Subsequent tying of the shield to the chassis at several points eliminated the harmonic leakage and cured the TVI.

Mobile Antennas: The relative strength of the magnetic field from mobile antennas may be checked using the Magnetometer as described for other antennas, except in most cases such antennas are vertically-polarized, requiring the instrument slot to be placed parallel with the earth.[5] Moving the Magnetometer up and down near the antenna will show the r.f.-current distribution which may differ considerably between various antennas, depending on whether base loading, center loading, no loading or a top hat is used. These indications will closely resemble the illustration often given of the current distribution on vertical antennas.

Conventional Field-Strength Readings: By installing a pickup antenna at the Magnetometer jack, the instrument may be used in the conventional manner as an ordinary field-strength meter. A 1-3 foot whip is sufficient for the v.h.f. range. Lengths of up to about 6 feet are more desirable for maximum sensitivity at lower frequencies, where a spiral-wound whip or the inclusion of a loading coil with the whip will provide even greater sensitivity.[6]

In order to minimize body-capacity and other effects and to enable the instrument to be maintained fixed in one position at a reasonable height above ground, installation of the Magnetometer on a metal tripod is recommended. If a wooden tripod is used, a wire lead should be run down each tripod leg and be connected to the instrument case. This will provide a stabilizing ground plane. Another expedient is to place the device on a large elevated metal surface or screen. Also note that for best accuracy in discriminating between vertically- or horizontally-polarized fields, the instrument antenna should be similarly oriented. This can easily be done by positioning the instrument accordingly by means of the tripod tilting adjustment.

Conclusion

The R.F. Magnetometer should prove to be a popular tool of invaluable aid in respect to antenna work and other applications related to r.f. radiation. Although only the main uses for the instrument have been described here, the foregoing principles of operation may serve as guide lines for additional purposes that might be found. Like any new device, however, further development and refinement for it are to be expected. Any suggestions along these lines and those for new applications will be most welcome. ■

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[5] The procedure also applies to other vertical antennas.

[6] Slightly increasing the value of the antenna-coupling capacitor, C_1, also will improve sensitivity here.

Hadley Helps Hams Get On The Air

BLIND persons interested in becoming amateur radio operators can now prepare themselves for official licensing and successful experience as hams through a special free correspondence course developed by the Hadley School for the Blind, Winnetka, Illinois.

Entitled "Amateur Radio Theory," the course was launched three years ago under the direction of Byron Sharpe, W9BE, a prominent lawyer from Glencoe, Illinois. The course rapidly became one of the School's most popular. Now taught by Mr. Sharpe and two other Hadley instructors, it continues to be a favorite. Already a dozen prospective hams have graduated, and a hundred more are presently enrolled.

The students vary greatly in age, background, and geographical location. They reside in all parts of the United States and in such faraway places as Scotland, Mexico, New Zealand, the Philippines, and India. One student is an eighty-two-year-old medical doctor who recently lost his sight; another is a high-school senior who has been blind since birth.

Offered without cost, Amateur Radio Theory is available in Braille and on tape. The fourteen lessons present essential topics: alternating and direct current; vacuum tubes and their uses; transmitters, receivers, and antennas; Morse code; and FCC Regulations. Each section of the text includes a series of questions designed to gauge the student's understanding of the material. The student types or tape-records his answers and sends them to his instructor, who in turn responds with a personalized letter of correction, explanation, and encouragement.

[*Continued on page 102*]

The Science of Phone Patching

BY T. A. PREWITT,* W9IJ/N0PRV

With phone patch traffic from the Indo-China war at a crest, thousands of U.S. amateurs engage almost daily in this fine public service activity. Usually, however, the amateur struggles by with little formal knowledge of the phone patch technique, and how to minimize costs to themselves and the parties called. This article could save hours of wasted effort and dollars at both ends of the phone patch circuit.

ALTHOUGH I enjoy contests, ragchewing, and DX, the operating hours which give me the greatest sense of accomplishment are those spent in phone patching for our armed forces overseas. Not soon to be forgotten are the thanks of the young mother who talked over our patch to her husband aboard ship in the North Atlantic, describing to him the new son he had yet to see.

Most U.S. military bases overseas and ships at sea have an amateur or MARS station which is intended primarily for phone patching. A serviceman who wishes to call his family back home comes to the station, gives the operator the telephone information, and waits his turn. The overseas ham operator then attempts to place the patch through a stateside ham who lives close to the party to be called, since everyone knows this will minimize the toll charge to be paid by the serviceman's family (in many cases this assumption is far from true, but more about that later). The stateside ham places a collect call to the desired party, gives a quick briefing on procedure, if needed, and goes to the patch. During the conversation which follows, the operators at both ends of the circuit must monitor to switch between receive and transmit, to discourage security violations, and occasionally, to warn one of the parties about the use of improper language over the air. Although they, by necessity, must be eavesdroppers to the conversation, experienced phone patch operators regard its subject matter as priviledged, and do not disclose it to others.

Equipment

Although there are many paths over which patches may be run with barefoot transceivers, this practice allows no margin of safety when QRM or QSB set in. Since it is embarrassing to have to terminate a patch prematurely under these conditions, a linear amplifier and a good antenna are highly recommended for use by the serious phone patcher. The patch itself is not critical, as long as it does not pick up hum, and a good homebrew unit[1] will serve as well as a deluxe factory-built or kit patch. Most operators use PTT in preference to VOX to lessen the likelihood of doubling, so the hybrid VOX capability of a more costly patch is not essential.

Crosstalk interference to other telephone conversations may result if the outgoing level from your patch is excessive. For this reason, your patch should include a VU meter. Unless you live several miles from the telephone exchange which serves your phone, adjusting the outgoing level for peaks of −10 VU will provide a comfortable listening level for your party. If you have reason to believe that he has impaired hearing, increasing the level three or four VU may be helpful. Higher outgoing levels are neither necessary nor desirable. When the telephone company installs a voice coupler for use with a phone patch, they will measuse the line loss between your phone and the central office, and specify an exact peak line level.

One additional precaution must be ob-

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*2217 S. Webster, Kokomo, Ind. 46901

[1] Erland, "Junkbox Phone Patch," *CQ*, October 1969, page 47.

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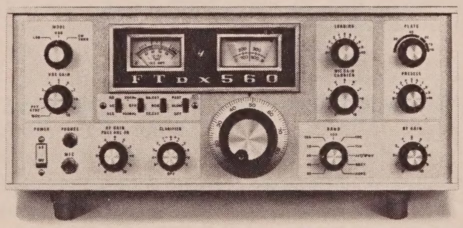

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served to avoid interference with the telephone company's SF (Signal-Frequency) signaling system, which monitors long-line calls for the 2600 c.p.s. signaling tones which initiate disconnect, billing, and channel processing functions the short, high-pitched "beep" which you hear at the end of a long-line conversation when the other party hangs up first is the SF disconnect tone). Although the SF system is designed to ignore 2600 c.p.s. tones which are accompanied by speech frequencies, the high-pitched sidebands from a strong interfering station two or three kc up the band from your receiving frequency can and will trigger it during pauses in the conversation, causing your call to be abruptly disconnected. Avoid this and other problems by adding a low-pass or notch filter to your patch.[2]

Although modern long-lines compandor (compresser-expander) equipment ordinarily maintains line levels remarkably uniform regardless of the distance covered by the call, the incoming signal sometimes will be too weak for full modulation of your transmitter if your party is using one or more extension phones so that others may join in the conversation, or if he is served by an antiquated local exchange. A speech processor with 10 db of gain, connected between the patch and your transmitter input, can be very helpful under these circumstances. Two more items round out the list of recommended equipment. The first is a timer, to remind you to identify your station at ten-minute intervals if the patch is a long one. And, finally, when running several consecutive patches, you will find a foot switch much more convenient to operate than the mike PTT switch.

Offering Your Services

You soon will learn to recognize three distinctly different phone patching situations, each of which calls for a different operating procedure on your part. The first of these is the straightforward case in which the overseas station is heard requesting a phone patch, or hears and calls you. In this situation,, of course, you need only make sure that his signal is of patch quality and that he is operating from a country with which third-party traffic is permitted.

More often, however, you will tune across a station which is already running patches through other stateside operators. In this case, listen carefully a few minutes to observe the operator's preferred procedure before breaking in with an offer to help. If he is giving telephone listings to the stateside station one at a time, wait until one has been passed and the stateside operator is on the phone placing the call. Beginning at that time is a period of sixty to ninety seconds in which you may call the overseas station briefly, identify your city, and offer to help with any traffic coming your way. Hold the length of this transmission to a few seconds, and sign and QSY promptly if he has nothing for your area. Most overseas operators appreciate such offers of help, as long as they do not interfere with the patch in progress.

A third type of phone patching operation you are likely to hear is one in which an overseas or maritime mobile station is keeping a regular schedule with one stateside station, which is typically located near a ship's home port or a military base where many dependents live. The stateside station often will work from a card file of frequently-called numbers, and some will have a special telephone operator, to whom the overseas station gives several telephone numbers at a time, so that she may have the next party waiting on the line and ready to talk as soon as the current patch is completed. Needless to say, the participants in this type of operation have little desire for outside help.

Effective Procedures

If you are handling the stateside end of a phone patch, what information do you need to do the job "professionally"? Of course, you will need the telephone number to be called. Have an Area Code map or directory handy, and check the area code given you for correctness. The full name of the person who is calling is essential, since your telephmone operator will request this information on all collect calls. Ask the caller for the name(s) of the person(s) he wishes to speak to, and get one of them on the line yourself before going to the patch. Also, ask the overseas caller if his stateside party is familiar with phone patch procedure. If not, explain the procedure as a matter of course. Try to avoid having to ask the stateside party if he has talked over a phone patch before—if he has not, he will not know what you are talking about. To get the conversation started smoothly, always let the overseas party talk first.

To avoid the "who-am-I-talking-to" open-

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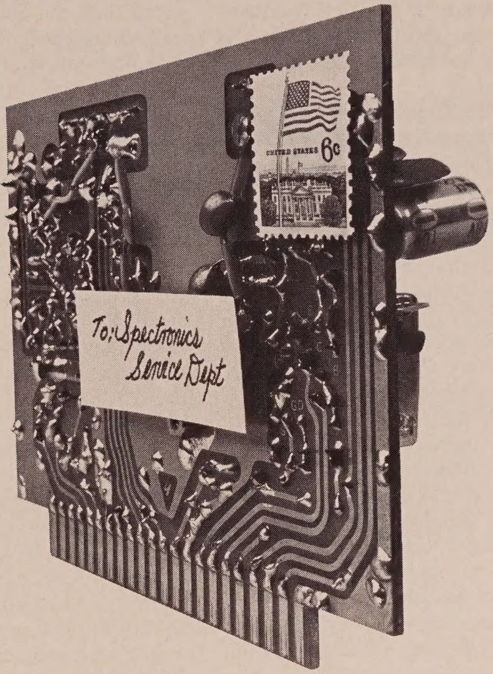
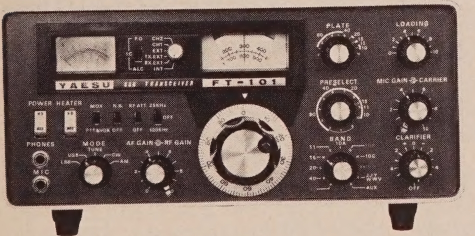
[2] Berry, "An Improved Phone Patch," *QST*, November, 1970, page 51.

Repair by mail.



Except for driver and finals, the Yaesu FT-101 is all solid state. Ten FET's, 3 IC's, 31 silicon transistors and 38 silicon diodes do the job — solidly. Most of these components are found on computer-type plug-in modules. Should one of them ever give you trouble, just send us the module. We'll send you a factory-new replacement by return mail.

But with the FT-101, you can expect everything but trouble. Like a built-in VOX, 25 KHz and 100 KHz calibrators, the WWV 10 MHz band, a high Q permeability tuned RF stage and a 5 KHz clarifier. All of that in a portable rig that sounds like it was home base.



The FT-101 is thirty pounds of power. You can work the world on 260 W PEP, 180 W CW or 80 W AM maximum input power. The world between 80 meters and 10 meters. And you'll hear it back with 0.3 microvolts sensitivity — and a 10 db signal-to-noise ratio.

This rig even includes 12 VDC and 117 VAC built-in power supplies right in the package. You supply the 12 or 117 volts plus an antenna and you're air-ready.

For in-motion operation, a noise blanker is essential. We didn't forget to include it in the FT-101. It picks out noise spikes and leaves you with nothing but clean, crisp signal copy.

Though plug-in modules mean quick, convenient repair, we don't really expect to hear from FT-101 owners. Unless it's on the air. Maybe that's why we unconditionally guarantee it for a year. The FT-101 — only $499.95.

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ing, tell him who you have on the line when you turn it over to him. Better still, turn on the patch and key your transmitter when the called phone is answered. This lets him hear for himself who has answered, and if the person he wants is not at home, he will hear the story first hand.

Attention to one further point can avoid embarrassment. Many times, we are asked to place a patch call for a serviceman who gives us his name and asks to speak to his mother. Before placing the call, we now ask him if his mother's last name is the same as his. If is has been changed through remarriage, we no longer commit social suicide by asking for her by her former husbands name.

Be sure to keep a permanent record of the names and telephone numbers of the persons to whom you place phone patch calls. FCC regulations require the names to be logged, since these persons speak over your station, and the telephone numbers are needed to resolve questions which occassionally arise if the person who accepted the collect call was not told where it originated, and subsequently fails to recognize it when it appeared on his next month's phone bill. To avoid this problem, make sure your telephone operator identifies your city as the originating point for the call.

Telephone Rates

As suggested earlier, it is not necessarily true that a toll call which spans the least distance will be billed at the lowest rate—and even though interstate toll call rates are lower than many persons think, every dollar can be important to a serviceman's family which is trying to get along on his service pay.

Four factors determine the cost of a toll call:

1. Type of call, whether Station-to-Station or Person-to-Person.
2. Time of day in the city where the call originates. The time in the city where the called party lives is immaterial.
3. Does the call cross a state line (interstate), or does it stay entirely within one state (intrastate)?
4. Distance covered by the call (rate step).

The decision between placing the call Person-to-Person or Station-to-Station is easy to make. When in doubt, go Station-to-Station. The reasoning here is that Person-to-Person rates are typically double the corresponding Station-to-Station rates, so even if you have to make two Station-to-Station calls, one to locate your party, and another at a later time to talk to him, you still pay no more than the cost of one Person-to-Person call. On the other hand, if he is at home when you first call, you have cut the cost in half. On either type of call, no charge is made if the called phone is not answered.

The local time in the city where the toll call originates is important, since it determines whether day or evening rates apply.

Very often, when it is late in the afternoon, a station in the Eastern time zone can place a call to a western city at a rate less than that which would apply if the call were placed by a much closer station located in a time zone where day rates are still in effect. As an extreme example, when it is 5:30 P.M., local time, in Indiana, I can place a patch call to a party in northern California at a lower rate than can a station in San Diego, where higher intrastate day rates are in effect. Remember that low evening rates first go into effect in the Eastern time zone, then sweep westward, hour by hour. Of course, the same reasoning applies in reverse to calls placed early in the morning, when the west coast stations will be the last to lose the low evening rate.

Interstate toll call rates are regulated by the Federal government, and are uniform throughout the continental United States. On the other hand, intrastate rates are administered separately by the Public Utilities Commission of each state, hence may vary widely from one state to another. Although in many states the intrastate rates are comparable to interstate rates, other states permit certain classes of intrastate calls to be billed at more than twice the rate the same call would take if it crossed a state line. We know of no state in which intrastate rates are lower than interstate rates.

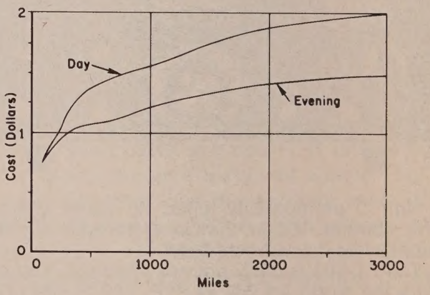
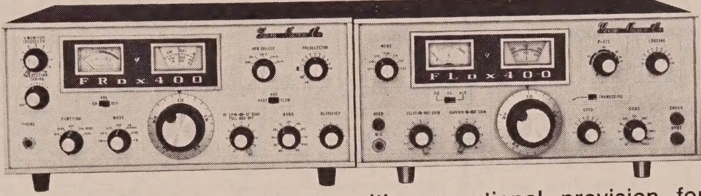


Fig. 1—Cost of a toll call as a function of distance. Data is for the initial 3-minute period of an interstate Station-to-Station collect call.

Now you don't have to pay twice the price to get twice the rig.



Picture this pair in your shack. The Yaesu FLdx 400 transmitter and the FRdx 400 receiver. Loaded with power. Loaded with sensitivity. Loaded with features. Loaded with value. Read on, and discover how you can have the most up-to-date receiver-transmitter rig in the world . . . and at an unbelievably low price.

The FRdx 400 Receiver

Get a big ear on the world with complete amateur band coverage from 160 meters through 2 meters, including WWV and CB reception. Four mechanical filters do it — they provide CW, SSB, AM and FM selectivity. Separate AM-SSB-FM detectors are included, along with squelch and transmit monitor controls. Plus a noise limiter and a variable delay AGC. And a built-in notch filter with front panel adjust for notch depth.

The FRdx includes calibration markers at 100 KHz and 25 KHz, with accurate calibrator checks verified by WWV. A solid-state FET VFO for unshakable stability. And a direct-reading 1 KHz dial affords frequency read-out to less than 200 Hertz.

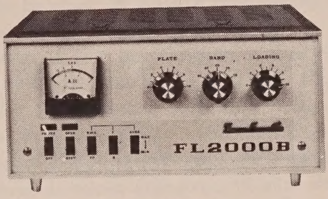
The FRdx 400 sells for $359.95.

The FLdx 400 Transmitter

Here's how to set yourself up with dual receive, transceive or split VFO operation. The FLdx 400 with its companion receiver brings you the ultimate in operational flexibility. Flexibility like frequency spotting, VOX, break-in CW, SSB, AM and even an optional FSK circuit.

The completely self-contained FLdx 400 features a built-in power supply, fully adjustable VOX, a mechanical SSB filter, metered ALC, IC and PO. A completely solid-state FET VFO provides rock-solid frequency stability.

We rate the FLdx 400 very conservatively. That rating guarantees you 240 W PEP input SSB, 120 W CW and 75 W AM. The FSK option will go all day at a continuous 75 W. And you get full frequency coverage on all amateur bands — 80 meters through 10 meters — with an optional provision for certain other bands that you can personally specify. For all that, you pay just $299.95.



FL2000 B Linear Amplifier.

Ideal companion to the Series 400, this hand-crafted linear is another example of Yaesu's unbeatable combination of high quality and low cost. Designed to operate at 1500 watts PEP SSB and 1000 watts CW, this unit provides superb regulation — achieved by a filter system with 28 UF effective capacity.

Other features include dual cooling fans (one for each tube), individual tuned input coils on each band for maximum efficiency and low distortion, and a final amplifier of the grounded grid type using two rugged carbon-plate 572 B tubes. Ready to operate at only $299.95.

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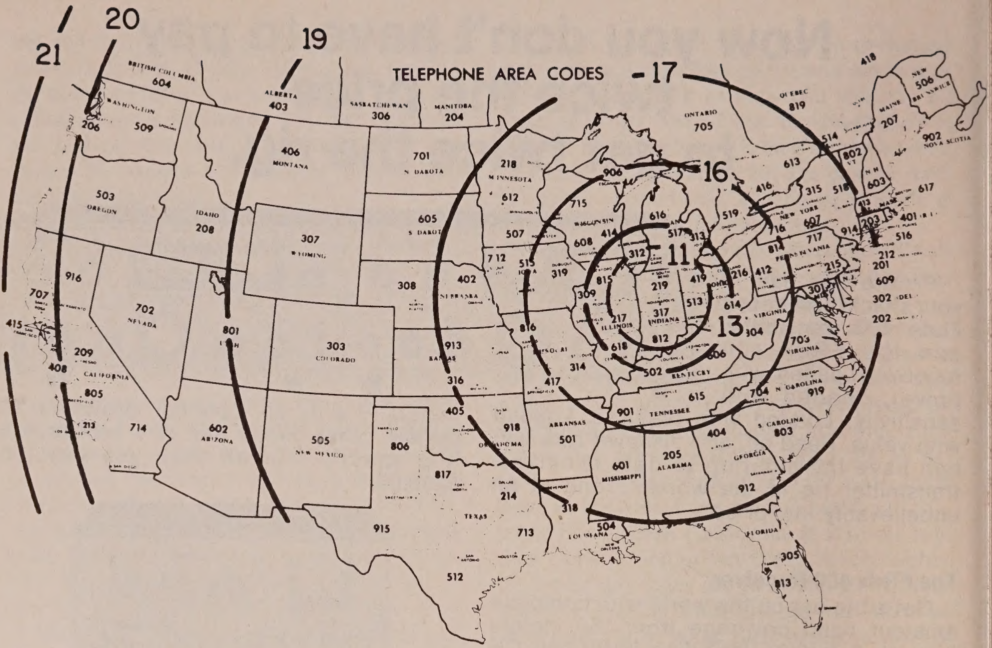
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Fig. 2—Rate estimator for Station-to-Station collect toll calls. The example shown is centered on Kokomo, Ind. Make one for your own location as described in the text. To use, find the smallest rate step circle which encloses the destination city, and read the rate from the chart below. Rates for the initial 3-minute period and for each suceeding minute are separated by a slant bar.

Many years ago, the distance spanned by a call was a major factor in determining the rate, but with the advent of modern automated long-lines switching systems, the cost differential between a 100-mile call and a 3000-mile call has shrunk to less than 2:1 Station-to-Station collect, evening rates). This may be seen clearly in fig. 1, which shows the cost of a call as a function of distance.

Estimating The Cost of a Toll Call

Although the exact cost of a call can always be obtained from the telephone operator, a quick approximation often is more useful in deciding how and when a call should be placed. The method to be described, which is based on a few simplifying assumptions, gives an immediate answer which is usually correct to within 25¢ of the exact cost of the call. We will consider only Station-to-Station collect calls, which constitute the majority of all phone patch traffic, and will work with interstate rates, which apply directly to most calls and which represent the lower boundary of costs for intrastate rate structures. Stateside stations may estimate the cost of any call originating from their city in the following manner. Obtain a United States map of convenient size, preferably one showing telephone area codes and time zones. Suitable maps are available in stationary stores, and often will be found in the front of your telephone directory. Determine the scale of miles for your map, and with your city as a center, draw a family of circles having radii corresponding to the rate step distances given in Table I. Label each circle with the appropriate rate step, as shown in fig. 2. Attach a copy of Table I to an unused corner of the map.

To use the rate estimator, locate on the map the city to which the call is going, and note the rate step shown on the circle which just encloses it. If the local (Standard or Daylight time in your city is between 8 A.M. and

RATE STEP	RADIUS, MILES	RATE	
		DAY	EVENING
11	148	.80/.20	.80/.15
13	244	.95/.25	.90/.15
16	430	1.25/.25	1.05/.20
17	675	1.35/.30	1.05/.20
19	1360	1.55/.35	1.20/.20
20	1910	1.70/.40	1.30/.25
21	3000	1.85/.45	1.40/.25

Table I—Data for preparing overlay for rate map.

5 P.M. on a non-holiday weekday, use the day rates shown in Table I. At all other hours, and on weekends and holidays, use the evening rates. Each entry in Table I consists of two figures, separated by a slant bar. The first figure is the rate for the first three minutes of the call, and the second figure gives the rate for each additional minute after the rst three. Add 10% tax to the total.

Overseas operators may estimate the cost of a call placed from any city in the country by drawing the circles on a transparent overlay, and centering it on the desired originating city.

It is important to note the far greater number of miles a call can span at a given cost of it is placed when evening rates are in effect. For example, one can call from Maine to California after 5 P.M. at the cost of a 431-mile daytime call. For this reason, it is much less important for an overseas station to attempt to raise a station near the city to which a patch is to go if he already has available a station in a time zone where evening rates are in effect.

Sponsored Holiday Calls

For the past two Christmas Days, my station has kept pre-arranged schedules with overseas military bases, running as many holiday patches as possible in the hours the band was open. All telephone charges were prepaid by local sorority, which sponsored the event as their Chirstmas project for the year. With all calls dialed direct at low DDD rates, the average cost to the sponsor was less than $1.05 per call.

For the benefit of others who wish to organize a similar sponsired operation on Valentine's Day, Mother's Day, or one the year-end holidays, we offer these suggestions. Make plans several weeks in advance, so the radio operator at the overseas base will have time to pass the word to the men, offering one five-minute holiday phone call home per man, on a first-come, first-served basis. To estimate the maximum number of calls which can be promised, multiply a rate of nine calls per hour (eight per hour on Christmas Day and Mother's Day, when telephone circuits are heavily loaded) times the number of hours the bands are expected to be open. The operation will go much more smoothly if the overseas operator and his Base Information Officer can take time to prepare a short form letter for each man to send home in advance of the holiday. The letter should state that the family may expect a call on the holiday, radio conditions permitting, and should explain phone patch procedure, so that none of the man's allotted time will have to be used for that purpose. A brief mention of the sponsoring organization is appropriate. When letters are sent as suggested, on the holiday you will find most families eagerly awaiting the call, and able to procede without further briefing. Some will even have prepared notes to remind them of things they want to be sure to talk about!

Ask the overseas operator to send you a serially-numbered advance copy of the list of names and numbers of the persons to be called, together with the name and relationship of the man who will be calling. When this is done, only the serial number of each call will have to be passed over the air, and errors will be less likely.

In order to stay on schedule, and to remain within your sponsor's budget, time the calls from the overseas end. Setting a limit of five minutes per call allows a maximum number of families to participate, yet gives each adequate time to exchange greetings. ■

Electrocardiograms Sent Via Amateur Radio

THE March-April *Bulletin* of the Medical Amateur Radio Council (MARCO) reports that on December 16, 1970, two electrocardiograms were transmitted by amateur radio from Glen Eschtruth, M.D., 9Q5GE, to Earl E. Weston, M.D., W8BXO. The electrocardiograms were transmitted by frequency modulating a 1700 cycle tone on 21.385 mc. The equipment used was the same as is used to send electrocardiograms over telephone wires. It was adapted with minor adjustments for amateur radio use. The distance covered by the transmission was estimated at 7,000 miles from the Southern Congo to Detroit. Dr. Weston is also currently serving as President of MARCO. For more information on MARCO write to: William L. Sprague, M.D., WA6CRN, 433 N. 4th St., Montebello, California 90640. ■

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Willow Grove, Pa. 19090
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Harrison Radio Corporation
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- 25 KHz calibrator and vox option
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- SWR 2:1 or less at band edges

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- 25db front-to-back ratio
- SWR less than 1.5:1 on all bands
- Takes maximum legal power

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- Three elements
- Up to 8db forward gain

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Model TH3JR THUNDERBIRD JUNIOR

- Three elements
- Meets space problems
- Up to 8db forward gain

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Model TH3Mk3 SUPER THUNDERBIRD

- Two elements
- Up to 5db forward gain

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Model 28

- Eight elements
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Model No. 215

- Fifteen elements
- Gain 17.8db

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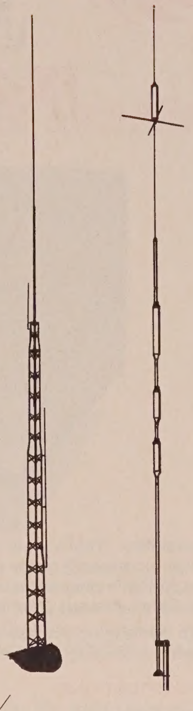

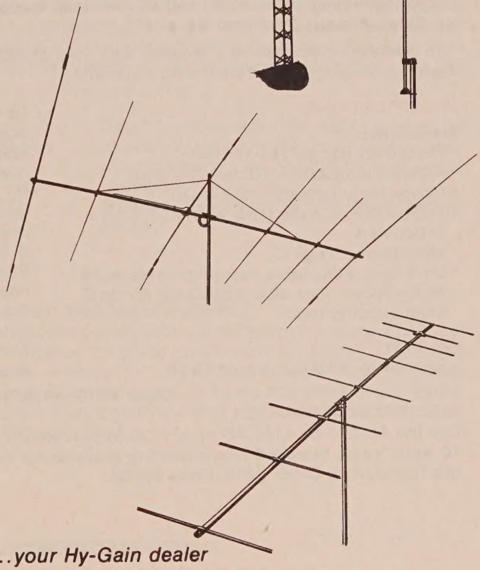

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Capability...That's what you purchase from Hy-Gain/Galaxy. Top performance from the first mass produced 2 meter transceiver. Fixed or mobile, the FM-210 will provide maximum pleasure with minimum investment. **And all American made too! No parts problems and backed by Hy-Gain's famous Customer Service!**

Top performing transceivers coupled with your choice of the world's best 2 meter antennas means a winning combination with capability...

SPECIFICATIONS:

Transmitter:

- Frequency Range: 143-149 MHz
- Antenna Impedance: 50 ohms nominal
- Power Requirements: 12-14v DC
- Transmitter: 5 watts (10w with AC-210 power booster)
- Microphone: High Z
- Deviation: Adjustable narrow or wide band with clipper filter also adjustable for optimum clipping lever

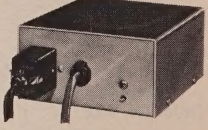
Receiver:

- Sensitivity: SINAD .5 uv for 12 db
- Quieting: 1 uv provides 20 db
- Squelch: Continuously adjustable
- Modulation Acceptance: FM wide band (narrow band available on special request)
- RF Circuitry: FET front end and duo conversion for minimum cross modulation and overload
- IF Frequency: 10.7 MHz and 455 KHz.
- Frequency Control: 3 channel transmit, 3 channel receive. (146.94 MHz furnished) Transmit and receive frequencies independent of each other
- Audio Output: 3 watts from internal 3.2" speaker

Order #813. Price $229.50

AC-210 POWER BOOSTER

Use the AC-210 on 115v AC or 12v DC to provide AC operation and 10 watts input. Supplied with mounting brackets for permanent mobile installation. Order #814. Price $49.00.



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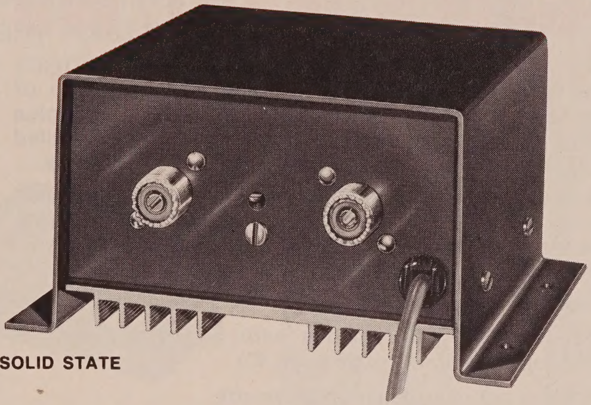
PA-210 2 Meter 35 Watt Mobile Amplifier



SOLID STATE

This all new ruggedized solid state two meter mobile amplifier provides 35 watts output to greatly increase your communication range. The PA-210 is a must for areas where no repeater is available. The PA-210 is designed as a companion for the FM-210. (When used as a system, the AC-210 power booster is not required.) A unique circuit protects the output transistor from voltage spikes and surges. All change over relay functions are internal and controlled by FM-210 circuitry through a connecting cable.

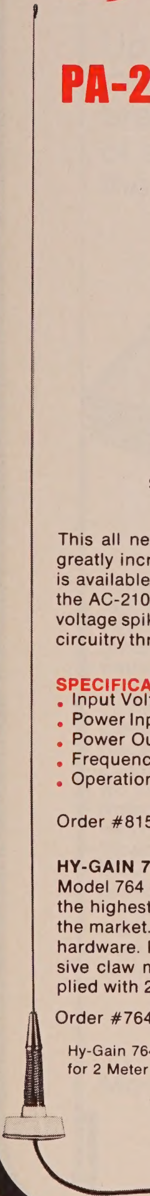
SPECIFICATIONS:
- Input Voltage: 12v DC, negative ground only
- Power Input: 60 watts
- Power Output: 35 watts
- Frequency Range: 143 MHz to 149 MHz
- Operation: Class C
- Drive Requirements: 5½ watts required for 35 watts output (the PA-210 provides operating voltages to the FM-210 for high power operation)
- Antenna Requirements: 50 ohms unbalanced

Order #815. Price $149.95

HY-GAIN 764 ⅝ WAVE GAIN ANTENNA FOR TWO METER MOBILE

Model 764 ⅝ wave antenna with 3 db gain professional mobile antenna for two meters provides the highest gain and best matched performance (52 ohms) than any other mobile antenna on the market. Handles 110 watts and is constructed of 17-7 ph stainless steel with chrome plated hardware. It features an etched copper matching coil on a G10 epoxy fiberglass board. Exclusive claw mount fits any size hole ⅜ to ¾″. Easy installation and high power capability. Supplied with 22′ of RG-58/U coax and PL-259 connector.

Order #764. Price $26.50



Hy-Gain 764 Gain Antenna
for 2 Meter Mobile

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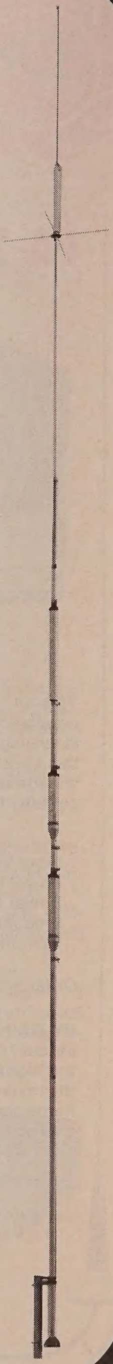

HY-GAIN'S 18AVT/WB

Take the wide band, omni-directional performance of Hy-Gain's famous 14AVQ / WB, add 80 meter capability plus extra-heavy duty construction—and you have the unrivalled new 18AVT/WB. In other words, you have quite an antenna.

- Automatic switching, five band capability is accomplished through the use of three beefed-up Hy-Q traps (featuring large diameter coils that develop an exceptionally favorable L/C ratio).
- Top loading coil.
- Across-the-band performance with just one furnished setting for each band (10 through 40).
- True 1/4 wave resonance on all bands.
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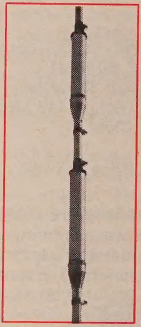
- Radiation pattern has an outstandingly low angle whether roof top or ground mounted.

CONSTRUCTION...of extra-heavy duty tapered swaged seamless aluminum tubing with full circumference, corrosion resistant compression clamps at slotted tubing joints...is so rugged and rigid that, although the antenna is 25′ in height, it can be mounted without guy wires, using a 12″ double grip mast bracket, with recessed coax connecter.



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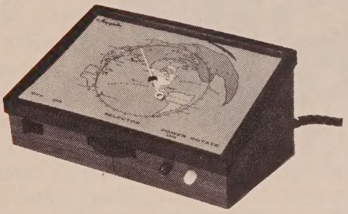
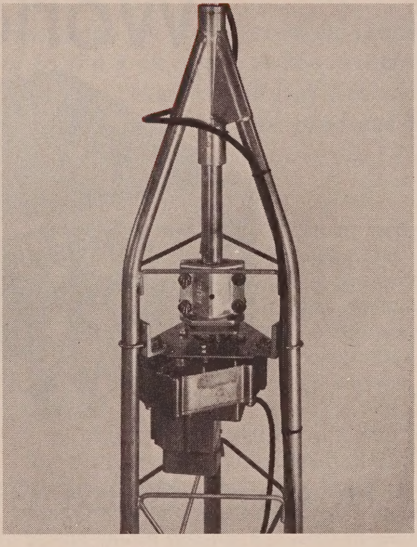
400 ROTO-BRAKE

Up to 10 Times the mechanical and braking capability of any rotator on the market!





- Handles large beams and stacked arrays with ease
- Delivers over 4,000 IN/LBS of starting and rotating torque
- Gear train protected by husky cast aluminum housing
- Solenoid operator brake adjusted to slip at 5,000 IN/LBS to prevent damage
- Extra heavy duty machined steel gears for maximum strength
- Handsome control unit features sweep pointer over choice of three great circle maps or compass rose
- Select desired position and rotator's logic circuit brings into desired position
- Capacitor start for high torque
- Operates off 110VAC 60 cycle power source
- No blind spots—moves 380°
- Antenna automatically moves to position when control is activated
- Heavy duty mast clamp takes up to 3″ O.D. mast
- Mounts to standard tower plate with min. of 10″ tower leg spacing
- Mounting kits available for poles or small towers
- Universal tower mount available
- Temperature range—30° F to 120° F
- Permanently lubricated
- Requires one 5 wire cable
- Cable available from Hy-Gain 412

Buy a 400 ROTO-BRAKE from the best distributor under the sun—the one who stocks Hy-Gain!

Model No. 400 Suggested retail price **$189.95**

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Standard of the World

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FUNCTION
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The GT-550A is available with a complete line of handsome matched accessories including a wattmeter/antenna selector; solid state VFO; and speaker. Check out the Standard of the World. See the GT-550A Transceiver and matching accessories at the best distributor under the sun—the one who stocks Hy-Gain antennas and Hy-Gain's Galaxy Line.

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What To Do With An Old Converter

BY ROBERT E. BAIRD,* W7CSD

In this age of mobile s.s.b. transceivers, many an old Morrow or Gonset tunable converter has been relegated to the junk heap. A few evenings work and a few dollars worth of parts will produce an all band receiver that will hold its own with many of the low-priced current products for standby or for the newcomer.

MOST of us do not regard as very good the old days of a.m. when every mobile had a mobile transmitter and some kind of short wave converter ahead of the car radio. Certainly the gear of that day and age is not held in very high regard now. Hams being by nature a rather Scotch bunch and inveterate scavengers, I suspect that many a ham shack, basement, attic, or back garage shelf still has an old all band mobile converter laying around. Such was the case at W7CSD. In our case it was an old Morrow but there are many other kinds equally good...or poor. These converters are too light to make good boat anchors so just what do you do with them?

Well, we had a young friend, hopeful to become a Novice, for whom we wanted to cobble up a useable receiver. We are not sufficiently flush to just rush out and buy one on the chance that the kid might take a liking to ham radio, so our eye lit on the old converter and at the same time we remembered several recent articles on direct conversion receivers. So we built a 1500 kc f.e.t. oscillator, (the frequency of conversion for the converter), a so called product detector from a chip, (actually it's a differential amplifier which yields the difference frequency between the incoming signal and the 1500 kc oscillator, which is the audio), and a single stage of audio.

This little jewel serves two purposes. First of all it will receive s.s.b. fairly well. Since the converter does not have a high ratio vernier dial the signal must be tuned in as close as possible and then zeroed by slightly moving the oscillator for optimum quality. This is done by adjusting the fine tuning control. This is merely a 1K pot in series with the oscillator source voltage. This much change of voltage will give a couple ks frequency variation of the 1500 kc oscillator and thus tune the s.s.b. signal on the nose. The receiver works very well on c.w. where again the fine tuning serves as a variable pitch control.

As can be seen from the diagram we ran the Morrow converter and solid state i.f. from a single 250 volt supply that we had on hand. The solid state portion derives its voltage across with a resistor R_1 wired in series with the converter B− line. In the case of the Morrow, the plate current was on the order of 25 ma. The solid state part required 10 ma

[*Continued on page 100*]

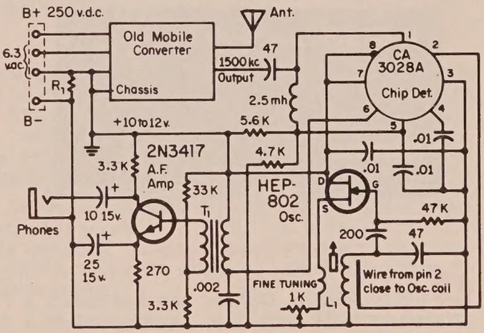

Fig. 1—Schematic of a solid state direct conversion product detector and a.f. amplifier for use with a retired all-band tunable mobile converter as an inexpensive beginners receiver.

L_1—Standard broadcast oscillator coil tuned to 1500 kc.

R_1—Value determined experimentally. For Morrow 5BR converter, 560Ω 2w. Adjust value to give 10-12 volt drop across resistor.

T_1—Transistor interstage transformer.

---

*3740 Summers Lane, Klamath Falls, Ore. 97601

New Amateur Products

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FREQUENCY
10 MHz
5 MHz
15 MHz
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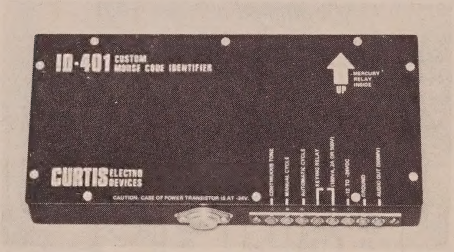
STANDARD-TIME RECEIVER
MODEL STR-1

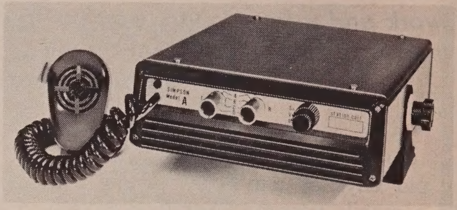
Caringella Electronics

A compact new receiver, known as the Model STR-1 Standard Time Receiver, is now available from Caringella Electronics, Inc. The STR-1 receives continuous standard-time and standard-frequency broadcasts from WWV on 5, 10, and 15 mc. Optional coverage is also available for Canadian standard-time broadcasts from CHU on 7.335 and 14.670 mc. A total of 10 transistors and 4 diodes are employed in the circuit. The unit works off of a.c., internal or external 12 v.d.c. The STR-1 is available in kit form at $74.95 and factory wired and tested at $94.95. For further information contact: Caringella Electronics, Inc., P.O. Box 327, Upland, California 91786 or circle 80 on the Reader Service coupon.


ID-401 CUSTOM MORSE CODE IDENTIFIER
MERCURY RELAY INSIDE
UP
CURTIS ELECTRO DEVICES
CAUTION: CASE OF POWER TRANSISTOR IS AT -24V.

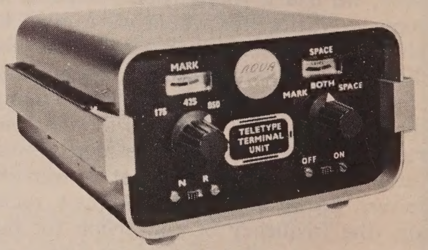
Curtis Electro Devices

CURTIS Electro Devices has announced a completely solid state f.m. repeater identifier designed to provide low cost, reliable call letter identification in accordance with F.C.C. regulations. The new unit called the ID-401, provides an audio tone output in the form of a Morse code identification (such as DE WA6JNJ) in addition to carrier keying. Identification is transmitted initially on repeater activation and then every three minutes as long as the repeater is being accessed. A final identification is transmitted after repeater activity ceases. Contact closure in the repeater control circuitry initiates identification. Price is $129.95, f.o.b. Mountain View California including the custom programmed memory. For complete specifications write to: Curtis Electro Devices, Box 4090, Mountain View, California 94040 or circle 81 on the Reader Service coupon.


SIMPSON
Model A
STATION CALL

Simpson Electronics

SIMPSON Electronics is now offering a new 2 meter f.m. mobile rig. It is called the Model A and has 4 channels and is supplied with 2 pair of crystals. It features 6 watts, mounting cradle, p.t.t. mike, easy access to all tuning and metering points and plug-in transmitter and receiver boards of G-10 glass epoxy. The amateur net price for the Model A is $249.00. For complete details write to: Simpson Electronics, Inc., 2295 N.W. 14th St., Miami, Fla. 33125 or circle 82 on the Reader Service coupon.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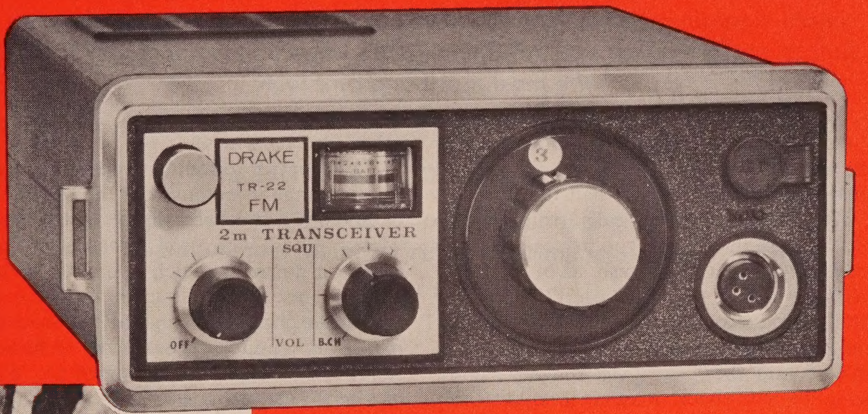
N
R

Aquadyne, Inc.

AN improved model of the Aquadyne RTTY receiving converter is now on the market. It is completely solid state and provides three shift frequencies, 850, 425 and 175 cycles. It may be used for either f.s.k. or a.f.s.k. and operates off of 110 v.a.c. The unit employs a toroid audio filter approx. 200 cycles wide at 850 shift. Unwanted signal attenuation is better than 40 db down. The terminal unit is priced at $139.95. A unit with an a.f.s.k. keyer is $159.95. For full information write to: Aquadyne, Inc., Box 175, East Falmouth, Mass., 02536 or circle 83 on the Reader Service coupon.

Versatility plus!...in a
2 Meter FM Transceiver

... IN THE FIELD
IN THE CAR
IN THE HOME ...



DRAKE MODEL TR-22
$199^{95} Amateur Net*

The TR-22 is a 2-meter VHF-FM completely transistorized, compact, portable transceiver with capacity for six channels. It can be used over the shoulder, mobile, or in your home. Has a built-in telescoping antenna, and SO-239 connector provided for external antenna. May be used barefoot or with accessory two-way amplifier. Operates on external 12 VDC or on internal rechargeable nickel-cadmium batteries. Has built-in 120 VAC 50-60 Hz battery charger.

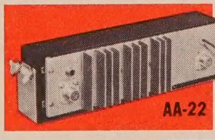
SPECIFICATIONS

GENERAL • **Frequency Coverage:** 144-148 MHz • **6 channels, 3 supplied:** **(1)** Rcv: 146.94 MHz, Xmit: 146.34 MHz; **(2)** Simplex: 146.94 MHz; **(3)** Rcv: 146.76 MHz, Xmit: 146.34 MHz • **Frequency modulation** • **Push-to-talk** Xmtr Control • **DC Power Drain:** Rcv: 45 mA, Xmit: 450 mA • **Power Source:** 12 VDC ± 20%; 120 VAC 50-60 Hz (for recharging nickel cadmium batteries only.) • **Size:** 5⅜″ x 2⁵⁄₁₆″ x 7⅛″, **Wt:** 3¾ lbs.

RECEIVER • **Completely transistorized** crystal controlled double conversion superheterodyne circuit. • **1st IF** 10.7 MHz • **2nd IF** 455 KHz • **Antenna Input Impedance:** 50 ohms • **Sensitivity:** 1 microvolt or less for 20 dB S+N/N ratio • **Audio Output:** 0.7 watt at 10% or less distortion • **Built-in speaker.**

TRANSMITTER • **RF Output Power** over 1 watt • **Frequency Deviation** adjustable to 15 kHz maximum; factory set to 5 kHz.

***PRICE OF TR-22 INCLUDES:** Dynamic Microphone, Over-the-Shoulder Carrying Case, 120 VAC and 12 VDC Power Cords, Speaker/Headphone Plug, and 10 Nickel-Cadmium Batteries.



Model AA-22 Accessory Amplifier $149.95. Improves receiver sensitivity and rejection of undesired signals. Provides at least 25 watts output with ½ to 3 watts drive. Fully automatic.

Model MNK-22 Mobile Mount for TR-22 **$6.95**

AT YOUR DEALER'S!

R. L. DRAKE COMPANY

540 Richard Street
Miamisburg, Ohio 45342

The WA0QPM "Call Alert"

BY LARRY WAGGONER,* WA0QPM

F.m.'ers who sometimes miss a call on the local calling frequency because they're out of the shack or have the audio turned down will appreciate this simple signaling device. The "Call Alert" can turn on a spotlight, ring a bell or perform what ever attention-getting function is necessary to wake the most moribund amateur.

THE "Call Alert" circuit was built to provide a visual indication of an incoming f.m. signal. At KEYN Radio, I had the problem of disc jockeys missing calls from mobile units because the control room speakers were turned up to near the threshold of pain. It's now hard to miss the "Call Alert" controlled spot light mounted just above the announcer's head.

I've found the "Alert" to be very handy also in the ham shack. It's easy to miss a QSO because you have turned the 2-meter f.m. receiver down.

When an incoming signal is received, the light flashes on for two seconds and will not be turned on again until the frequency is silent for twenty five seconds. Each additional exchange starts this re-cycle time over. This feature keeps the lamp from flashing repeatedly during conversations.

The circuit was designed to operate with a G.E. Progress Line base station. It has also been used on Prog Line mobiles. The "Call Alert" could be easily modified for use with other f.m. receivers.[1]

The control circuit is operated by the small change in potential at the squelch tube cathode, if it is moved slightly above ground. This method was used because it has no effect on normal squelch operation. With no carrier present, the squelch tube conducts, causing a positive voltage at the base of Q_1 making it conduct. Q_2, normally biased on by R_2, is turned off by the action of Q_1. When a carrier is received, the squelch tube no longer conducts, causing Q_1 to restore bias to Q_2, turning on the relay.

The connection to the G.E. Progress Line receiver is made by removing the ground wire on pin 3 of V_{312}, the 12AX7 Audio-Squelch tube. A wire from pin 3 is connected to the base of Q_1. Make certain a ground return is made back to the receiver.

The lead from the push-to-talk switch, keeps the lamp from flashing during transmission. A diode is inserted in the line to keep the "Alert" from affecting the P.T.T. operation. The connection to the Prog Line is made at the microphone jack pin 3.

C_1 controls the on-time of the relay, while R_1 determines the re-cycle time. An increase in either value will increase the time factor it determines. The value of C_1 is extremely high, but with the large number of surplus computer capacitors on the market, it is easy

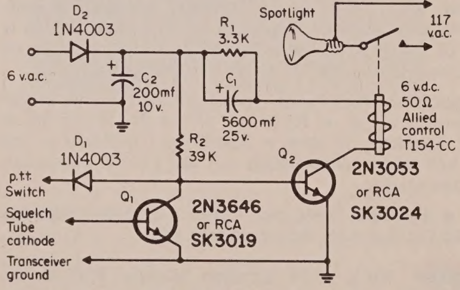

D2
1N4003
6 v.a.c.
+
C2
200mf
10 v.
R1
3.3K
Spotlight
117
v.a.c.
+
C1
5600 mf
25 v.
6 v.d.c.
50 Ω
Allied
control
T154-CC
D1
1N4003
R2
39 K
p.t.t.
Switch
Q1
Q2
2N3053
or RCA
SK3024
Squelch
Tube
cathode
2N3646
or RCA
SK3019
Transceiver
ground

Fig. 1—Simple "Call Alert" system by WA0QPM triggers a relay upon receipt of a signal at the squelch tube of the G.E. Progress Line 2-meter f.m. receiver. The relay is held energized for a period of time determined by C_1-R_1, (about 2 seconds), and is then de-energized for at least 25 seconds.

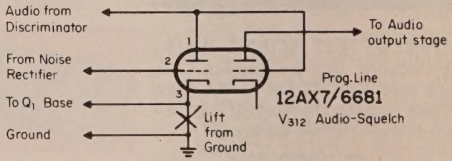

Audio from
Discriminator
To Audio
output stage
1
2
From Noise
Rectifier
Prog.Line
12AX7/6681
3
To Q1 Base
Lift
from
Ground
V312 Audio-Squelch
Ground

Fig. 2—Connections to the G.E. Progress Line base station receiver for the "Call Alert."

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*7611 Cottontail Lane, Wichita, Kansas 67212

[1] The circuit was built of surplus parts that were on hand; free substitutions can be made because the circuit is not critical.

to obtain at a low price. C_1 and R_1 can be left out of the circuit for normal C.O.R. operation. The 6 volts a.c. needed to operate the circuit can be taken from the transceiver power supply. If 6 volts d.c. is available, D_2 and C_2 may be omitted.

The "Alert" has been in operation at KEYN 24 hours a day for the last eight months with no problems. If the red spot light will catch the attention of a rock D-J during a full volume performance of the "Grand Funk Railroad's" latest record, it will easily wake up a sleepy 2-meter f.m. ham. ■

The Lazy Man's VXO for 2-Meters

BY MORT EISENBERG,* W3DYL

A super-simple way of getting v.f.o.-type operation with the 2-meter Gonset Communicator or other rig using similar oscillator design.

THIS "Lazy-Man's VXO" was born in a mad rush to have much needed variable frequency capability for the last VHF Sweepstakes. It is simple and is applicable to any transmitter using a parallel crystal oscillator. The variable crystal oscillator was installed in my venerable Gonset Communicator II for 2-meters.

As shown in fig. 1, the v.x.o. involves the addition of C_1, a 150 mmf variable (miniature) air capacitor connected in series with an r.f. choke of 27 microhenries, connected from crystal to ground.

The amount that 8 mc crystals can be changed in frequency varies considerably from crystal to crystal, probably due to different manufacturing techniques. In the circuit shown, the frequency change is about 15 kc at 8 mc or about 250 kc (18 × frequency multiplication) at the 144 mc output frequency. Note from the table below that the change is mostly *lower* than the crystal nameplate frequency.

Crystal Freq.	*Normal 2m. Freq.*	*C_1 Fully Closed*	*C_1 Fully Opened*	*Kc Change*
8055	144.990	144.787	145.047	260
8066	145.170	144.937	145.182	235

The Communicator transmitter knobs were removed and the transmitter module slipped out of the cabinet. The two right-hand crystal sockets (there are four in Communicator II) were removed from the aluminum mounting bracket. Spot and drill two holes for C_1 where these sockets were. Wire per fig. 1 and attach an extension shaft. Add a knob after returning the module to its cabinet. The job is done!

Plug in one crystal and turn the crystal switch to appropriate position. Use only one crystal at a time, as interaction occurs if two are plugged in.

The oscillator output sags a little at the extreme low end of the range, but not enough to reduce the transmitter output.

The added pleasure through the greatly increased percentage of answered calls makes this modification well worth the afternoon's work. ■

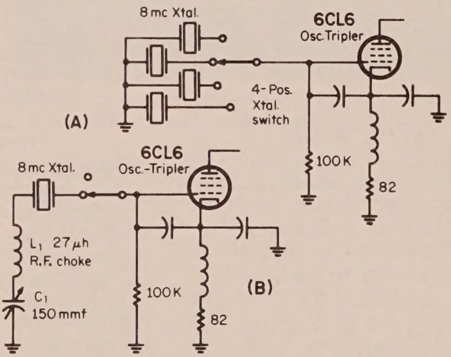

Fig. 1—(A) Original grid circuitry of the transmitter oscillator of the Gonset Communicator II. (B) The addition of C_1 and L_1 enable v.x.o. operation by the simple expedient of pulling the 8 mc crystal's fundamental frequency. Up to about 250 kc of frequency swing is possible at 2 meters.

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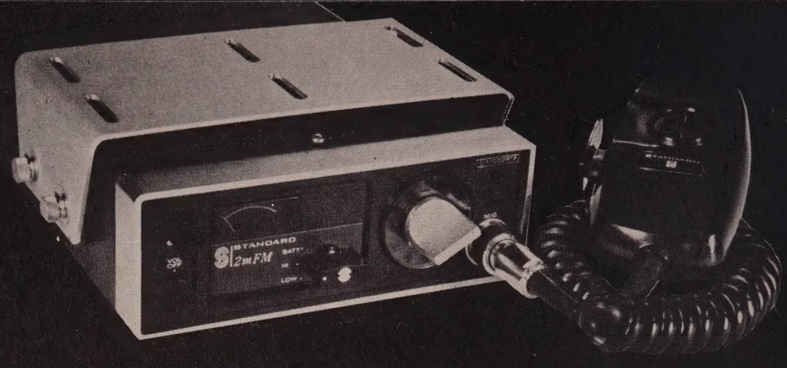
*1224 McKinley St., Philadelphia, Pa. 19111



New FM for '71 Standard's SR-C826M

professional quality, solid state, two-way radio, designed and sold exclusively for amateur use in the United States and Canada.

Standard Communications Corp., the world's largest manufacturer of marine V.H.F. equipment, has just developed a new industrial quality, high performance 2-meter unit. This rugged, compact transceiver is available only in the U.S. and Canada thru an authorized Standard dealer. The "826" is so compact that it makes mobile installation practical in almost any vehicle or aircraft, it becomes fully portable with the addition of Standard's battery pack.

GENERAL

Freq. Range — 143 to 149 MHz, 2 MHz spread

Supply voltage — 11 to 16 VDC. Negative Ground 13.8VDC nominal

Current Consumption — .15 amp receive standby. 2.4 amp transmit

Number of channels — 12-Supplied with 4 channels

1) 146.94 Simplex
2) 146.34/94
3) 146.76 Simplex
4) 146.34/76

Microphone — Dynamic

Dimensions — 6⅞"w x 2½"h x 9⅞"d

Weight — 4½ lbs. max.

Frequency stability—.001% (−10 to +60°C)

TRANSMITTER

RF power output — .8 or 10 watts

Output impedance — 50 ohms nominal

Deviation — Internally adjustable to ±10 kHz min. factory set to ±7 kHz

Spurious and harmonic attenuation — 50dB below the carrier power level

Type of modulator — Phase

RECEIVER

Sensitivity — .4 or less microvolts for 20 dB quieting

Squelch sensitivity — Threshold — .2 microvolts or less

2 MOSFET RF Amplifiers
1 MOSFET Mixer

Deviation acceptance — Up to ±15 kHz deviation

Spurious and image attenuation — 65 dB below the desired signal threshold sensitivity

Adjacent channel selectivity (30 kHz channels) — 60 dB attenuation of adjacent channel

Type of receiver — Dual conversion superheterodyne

Audio output — 5 watts For external speaker

$339.95 (complete as shown with microphone, built-in speaker and external alternator whine filter.)

STANDARD COMMUNICATIONS CORP.

World's largest manufacturer of marine V.H.F. equipment

P.O. Box 325, Wilmington,
Calif. 90744 (213) 775-6284

Yagi Antennas Use New Techniques for Low Weight, High Strength

It has not been *CQ*'s general practice to evaluate commercial antennas due to the great space and equipment required to do a thoroughly professional job. With no intent to violate this precept, we'd like to at least call attention to an interesting new design concept for amateur beam antennas.

The new Kirk Helicoidal beams for 40, 20, 15 and 10 meters are unique in that they are light. For example, a 3-element 20-meter antenna weighs a mere 19 pounds as opposed to over 30 pounds for most similar all-metal beams.

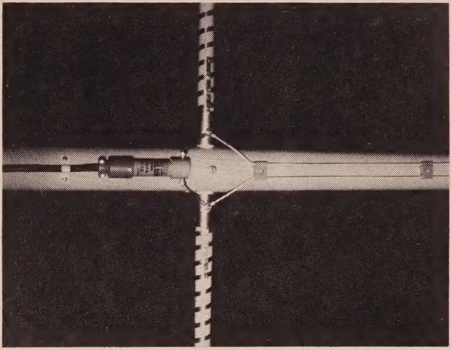
The light weight is achieved through the use of fiberglass tubing for booms and elements, which we believe is a "first" in commercially produced amateur beams. Strength does not appear to have been sacrificed as the antennas are claimed to be able to survive 110 m.p.h. winds with no ill-effects and no permanent bending of boom or elements. Element halves are tapered and are joined where they pass through the tubular fiberglass booms as shown in the top photo. The conducting and radiating surfaces of elements are spirally wound of copper tape which is then coated with a polyurethane sealant, said to greatly reduce precipitation static.

Adding to the light weight is the fact that the helical element design permits about a 25% reduction of element length due to the inherent inductive loading.

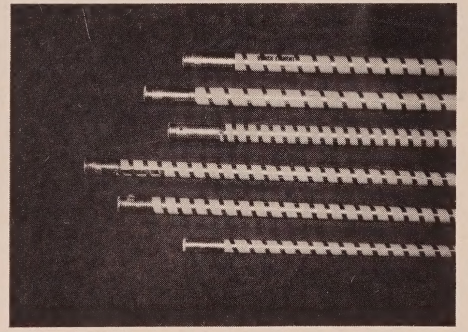
A little thought reveals the difficulty faced by the manufacturer in wrapping a single length of copper tape at a fixed pitch on a tapered element and keeping the tape flat to the fiberglass. But the design by Kirk of special winding equipment overcomes this problem while giving complete flexibility in the selection of an appropriate winding pitch for different antennas.

An added "advantage" to amateurs with critical wives and neighbors is the "sky-blue" color of the fiberglass. It won't make the antenna exactly disappear from view, but it ought to make it a bit less objectionable to the non-ham.

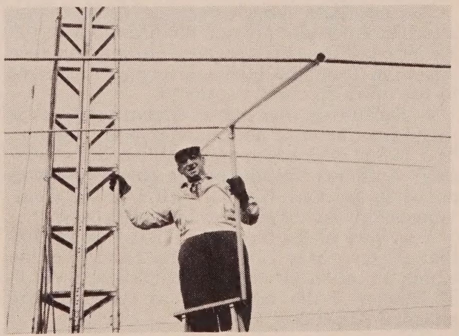
Antennas are available in 2, 3, 4 and 5-element versions for 40 through 10 meters. Only single band antennas are available. Weights range from 7 pounds for a 2-element 10-meter beam to 89 pounds for a 5-element 40-meter beam. Prices range from under $90 to over $1000.



Tubular tapered elements pass through the tubular booms, all of lightweight fiberglass.



Various tape winding pitches are needed for different band antennas.



Kirk Chief Engineer "Doc" Self is shown holding a 3-element 20-meter beam—all of 19 lbs!

Changes In 160 M. Frequencies Available for Amateur Use

Before the
FEDERAL COMMUNICATIONS
COMMISSION
Washington, D.C. 20554

In the Matter of Amendment of Parts 2 and 97 of the Commission's Rules to modify the availability of frequencies in the band 1800-2000 kc/s for use by the Amateur Service on a shared basis with LOREN stations.

ORDER

Adopted: February 24, 1971
Released: February 26, 1971

By the Commission:

1. The Commission has under consideration the above-entitled matter.

2. The Commission has been advised by the United States Coast Guard that certain changes in the Loran-A radionavigation system are necessary for implementation by May 1, 1971. In accordance with Sections 2.106 and 97.61 of the Commission's Rules, Parts 2 and 97 respectively, sharing of the 1800-2000 kc/s band by the Amateur Radio Service is subject to the conditions that:

(a) Such use shall not be a bar to the expansion of the Loran-A service;

(b) Such use shall not cause harmful interference to the Loran-A service; and

(c) The provisions for sharing by the Amateur Service shall be considered as temporary in the sense that they shall remain subject to cancellation or to revision, in whole or in part, by order of the Commission without hearing whenever the Commission shall deem such cancellation or revision to be necessary or desirable in the light of the priority within this band of the Loran-A system of radionavigation.

3. Essentially the changes set forth in the attached Appendix provide modifications in the Pacific coast frequency segments to shift amateur operation from the higher frequency segments to the lower frequency segments.

4. Because of the above circumstances it is found that the prior notice and public procedure of 5 U.S.C. 553 are impracticable and unnecessary. Authority for these rule changes is contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended.

5. In view of the foregoing, IT IS ORDERED that, effective May 1, 1971, Parts 2 and 97 of the Communication's Rules are amended by revision of Sections 2.106 and 97.61 as shown in the attached Appendix.

FEDERAL COMMUNICATIONS COMMISSION
Ben F. Waple
Secretary

II. Part 97 of the Commission's Rules is amended as follows:

In §97.61, paragraph (b) is amended as as follows:

§97.61 Authorized frequencies and emissions.

* * *

(b) Limitations

(1) The use of frequencies in this band is on a shared basis with the LOREN-A radionavigation system and is subject to cancellation or revision, in whole or in part, by order of the Commission, without hearing, whenever the Commission shall determine such action is necessary in view of the priority of the LORAN-A radionavigation system. The use of these frequencies by amateur stations shall not cause harmful interference to LORAN-A system. If an amateur station causes such interference, operation on the frequencies involved must cease if so directed by the Commission.

(2) Operation shall be limited to:

Maximum D.C. Plate Input Power in Watts

Area	1800 to 1825 kc		1825 to 1850 kc		1850 to 1875 kc		1875 to 1900 kc		1900 to 1925 kc		1925 to 1950 kc		1950 to 1975 kc		1975 to 2000 kc	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Alabama	500	100	100	25	0	0	0	0	0	0	0	0	100	25	500	100
Alaska	1000	200	500	100	500	100	100	25	0	0	0	0	0	0	0	0
Arizona	1000	200	500	100	500	100	0	0	0	0	0	0	0	0	0	0
Arkansas	1000	200	500	100	100	25	0	0	0	0	100	25	100	25	500	100
California	1000	200	500	100	500	100	100	25	0	0	0	0	0	0	0	0
Colorado	1000	200	500	100	200	50	0	0	0	0	0	0	0	0	200	50
Connecticut	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
Delaware	500	100	100	25	0	0	0	0	0	0	0	0	0	0	100	25
District of Columbia	500	100	100	25	0	0	0	0	0	0	0	0	0	0	100	25
Florida	500	100	100	25	0	0	0	0	0	0	0	0	100	25	500	100
Georgia	500	100	100	25	0	0	0	0	0	0	0	0	0	0	200	50
Hawaii	0	0	0	0	0	0	0	0	200	50	100	25	100	25	500	100
Idaho	1000	200	500	100	500	100	100	25	100	25	100	25	100	25	500	100
Illinois	1000	200	500	100	100	25	0	0	0	0	0	0	0	0	200	50
Indiana	1000	200	500	100	100	25	0	0	0	0	0	0	0	0	200	50
Iowa	1000	200	500	100	200	50	0	0	0	0	100	25	100	25	500	100
Kansas	1000	200	500	100	100	25	0	0	0	0	100	25	100	25	500	100
Kentucky	1000	200	500	100	100	25	0	0	0	0	0	0	0	0	200	50
Louisiana	500	100	100	25	0	0	0	0	0	0	0	0	100	25	500	100
Maine	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
Maryland	500	100	100	25	0	0	0	0	0	0	0	0	0	0	100	25
Massachusetts	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
Michigan	1000	200	500	100	100	25	0	0	0	0	0	0	0	0	100	25
Minnesota	1000	200	500	100	500	100	100	25	100	25	100	25	100	25	500	100
Mississippi	500	100	100	25	0	0	0	0	0	0	0	0	100	25	500	100
Missouri	1000	200	500	100	100	25	0	0	0	0	100	25	100	25	500	100
Montana	1000	200	500	100	500	100	100	25	100	25	100	25	100	25	500	100
Nebraska	1000	200	500	100	200	50	0	0	0	0	100	25	100	25	500	100
Nevada	1000	200	500	100	500	100	100	25	0	0	0	0	0	0	0	0
New Hampshire	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
New Jersey	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
New Mexico	1000	200	500	100	100	25	0	0	0	0	100	25	500	100	1000	200
New York	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
North Carolina	500	100	100	25	0	0	0	0	0	0	0	0	0	0	100	25
North Dakota	1000	200	500	100	500	100	100	25	100	25	100	25	100	25	500	100
Ohio	1000	200	500	100	100	25	0	0	0	0	0	0	0	0	100	25
Oklahoma	1000	200	500	100	100	25	0	0	0	0	100	25	100	25	500	100
Oregon	1000	200	500	100	500	100	100	25	0	0	0	0	0	0	0	0
Pennsylvania	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
Rhode Island	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
South Carolina	500	100	100	25	0	0	0	0	0	0	0	0	0	0	200	50
South Dakota	1000	500	500	100	500	100	100	25	100	25	100	25	100	25	500	100
Tennessee	1000	200	500	100	100	25	0	0	0	0	0	0	0	0	200	50
Texas	500	100	100	25	0	0	0	0	0	0	0	0	0	0	200	50
Utah	1000	200	500	100	500	100	100	25	100	25	0	0	0	0	100	25
Vermont	500	100	100	25	0	0	0	0	0	0	0	0	0	0	0	0
Virginia	500	100	100	25	0	0	0	0	0	0	0	0	0	0	100	25
Washington	1000	200	500	100	500	100	100	25	0	0	0	0	0	0	0	0
West Virginia	1000	200	500	100	100	25	0	0	0	0	0	0	0	0	100	25
Wisconsin	1000	200	500	100	200	50	0	0	0	0	0	0	0	0	200	50
Wyoming	1000	200	500	100	500	100	100	0	100	25	0	0	0	0	200	50
Puerto Rico	500	100	100	25	0	0	0	0	0	0	0	0	0	0	200	50
Virgin Islands	500	100	100	25	0	0	0	0	0	0	0	0	0	0	200	50
Swan Island	500	100	100	25	0	0	0	0	0	0	0	0	100	25	500	100
Serrana Bank	500	100	100	25	0	0	0	0	0	0	0	0	100	25	500	100
Roncador Key	500	100	100	25	0	0	0	0	0	0	0	0	100	25	500	100
Navassa Island	500	100	100	25			0	0	0	0	0	0	0	0	200	50
Baker, Canton					0	0										
Enderbury, Howland	100	25	0	0			100	25	100	25	0	0	0	0	100	25
Guam, Johnston,					0	0										
Midway	0	0	0	0	0	0	0	0	100	25	0	0	0	0	100	25
American Samoa	200	50	0	0	0	0	200	50	200	50	0	0	0	0	200	50
Wake	100	25	0	0	0	0	100	25	0	0	0	0	0	0	0	0
Palmyra, Jarvis	0	0	0	0	0	0	0	0	200	50	0	0	0	0	200	50

There are just 2 ways to sell the HAM RADIO market . . .

the hard way is one . . .

the CQ way is the other !

CQ makes selling your product or service to fellow hams easy, because CQ reaches more active ham readers each month than all the others. And CQ's ad rates are surprisingly lower than our major competitor, because CQ wants our advertisers to show a profit for their investment.

And what's more, CQ ads now reach the ham fraternity a full month earlier than ads in the other magazines. We've advanced our closing, printing and mailing dates, so that this issue of CQ will be in the hands of our readers at the same time they're getting last month's issue of Brands X, Y & Z. That's one of the reasons that dozens of advertisers have made CQ Number One on their ad program.

If you have a product or service to sell, why not get in touch with our publisher right away. You won't get a hard time, and you won't get a lot of fancy promises that can't be kept. Just the straight facts about what results you should get from your sales program.

We have a complete art staff on hand, and can also handle all your type-setting needs.

So don't put off, call 516 883-6200 and ask for Dick Cowan. That's all it takes to get your business growing.

Advertising Rates – Cost Per Insertion

Rate earned based on total space used within one year – 12 issues.

	1 time	3 times	6 times	12 times
1 Page	$525	$470	$430	$385
1/2 Page	275	255	235	215
3/8 Page	220	205	195	180
1/4 Page	150	140	130	120
3/16 Page	106	101	97	93
1/8 Page	80	75	70	65
1/16 Page	40	38	35	33

Break-In C.W. With the Drake TR-3

BY JAMES E. McALISTER,* WA5EKA

Comfortable c.w. operation demands some form of break-in, but most of the older s.s.b. transceivers lacked full provision for such operation. This small construction project overcomes the c.w. shortcomings of the popular Drake TR-3 transceiver.

LIKE many of the first s.s.b. transceivers, the Drake TR-3 was designed primarily with the phone operator in mind. C.w. operation is provided, but many desirable features, including full break-in c.w. and c.w. side-tone, have been excluded. Full break-in with the TR-3 (and many other transceivers) would be impractical without elimination of switching relays. Automatic c.w. switching, however, is much more convenient than the manual switching provided, and it is quite easy to implement.

The basic philosophy behind the switching scheme presented here is presently quite popular – an audio tone is used to actuate the VOX relay, which causes the rig to go from transmit to receive. In the TR-3, however, some switching in addition to that done by the VOX relay must be performed to put the rig on c.w. This is normally done by the mode switch S_2.

The balanced modulator, for example, is unbalanced when S_2 is in the c.w. position, and the carrier frequency is shifted by 1 kc. These two functions must be performed automatically when the key is depressed if break-in is desired. For simplicity, another relay can be added to the TR-3 to execute the switching.

Additional Circuitry

Before discussion of the actual wiring changes needed within the TR-3 itself, some understanding of external circuitry required is in order. Figure 1 shows a relatively simple solid state circuit which not only provides the necessary switching, but also injects a side-tone for monitoring into the receiver audio.

Q_1 is an N-channel fet and is used to control both the external relay and the sidetone. Its gate goes to the hot side of the key jack, which is at a potential of –60 volts. This negative voltage keeps Q_1 biased off so that no current flows through R_2. When the key is depressed, however, Q_1's gate is grounded, and a voltage is developed across R_2, causing both Q_2 and Q_4 to conduct.

Current through Q_2 actuates external relay K_1 and current through Q_4 allows unijunction transistor Q_3 to generate the sidetone. R_5 and C_6 determine the frequency of this sidetone. The sawtooth oscillator signal is buffered by emitter-follower Q_5 before being fed directly to the input of the VOX amplifier (V_{19}, pin 7). A portion of the sawtooth is taken from the wiper of R_9, which serves as a sidetone volume control, before being applied to the audio amplifier (V_{17}, pin 7). Even through the key may be released, K_1 will remain energized until the VOX relay releases after its set delay.

Germanium diodes CR_1 and CR_2 are used to prevent the circuit from operating when the rig is operated on s.s.b. With the function switch S_2 in the s.s.b. position, the cathodes of both diodes are grounded by S_{2B} and prevent Q_2 and Q_4 from conducting in the event the key is depressed.

The relay used in this circuit is a surplus 28 volt unit, but almost any relay with a sufficient number of contacts would be satisfactory. Relay power is obtained from a voltage doubler (C_2, CR_3, CR_4, C_3). R_8 and zener diode CR_5 provide 9 volts for circuit power.

Changes In The TR-3

As mentioned previously, relay K_1 is added to perform switching functions previously done by switch S_2. To do this, several simple

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*216 N. 10th Street, West Helena, Ark. 72390.

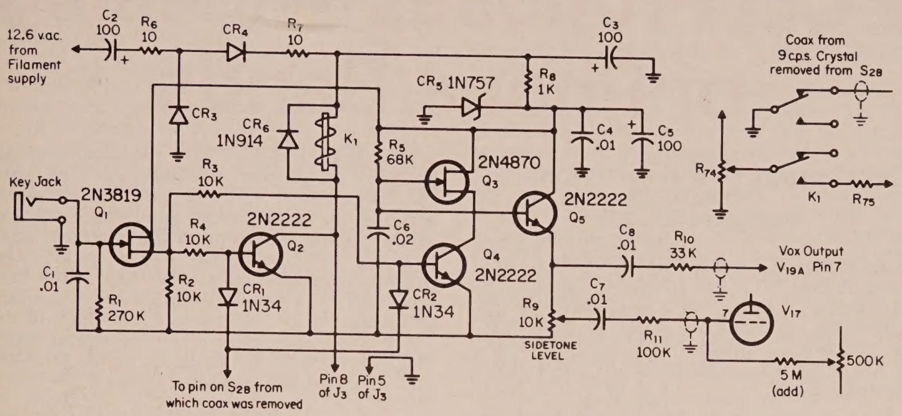

12.6 v.ac. from Filament supply
C2 100
R6 10
CR4
R7 10
C3 100
Coax from 9 cps. Crystal removed from S2B
CR5 1N757
R8 1K
CR3
CR6 1N914
K1
R5 68K
2N4870 Q3
C4 .01
C5 100
R74
K1
R75
Key Jack
2N3819 Q1
R3 10K
R4 10K
2N2222 Q2
C6 .02
2N2222 Q5
C8 .01
R10 33K
Vox Output V19A Pin 7
C1 .01
R1 270K
R2 10K
CR1 1N34
Q4 2N2222
CR2 1N34
R9 10K
SIDETONE LEVEL
C7 .01
R11 100K
7
V17
500K
5 M (add)
To pin on S2B from which coax was removed
Pin 8 of J3
Pin 5 of J3

Fig. 1—Solid state adapter for break-in c.w. operation of the Drake TR-3 transceiver including a c.w. sidetone generator. Relay K_1 is a surplus 28 v.d.c. relay, but any relay with sufficient contacts is suitable. All resistors are 1/4 watt; all capacitors are in mf.

wiring changes to the TR-3's circuitry must be made.

First, the miniature coaxial cable coming from the 9 mc crystal should be removed from S_2 and reconnected to K_1 as shown in fig. 1. The capacitance of this coax controls the c.w. frequency shift, so all connections made to the relay contacts should be as short as possible or instability may be caused.

Next, the center wiper of R_{74} (part of the transmitter gain control) should be connected to the other half of K_1 as shown. R_{74} applies voltage to the balanced modulator in order to unbalance it for c.w. transmission. This now will happen only when K_1 is energized.

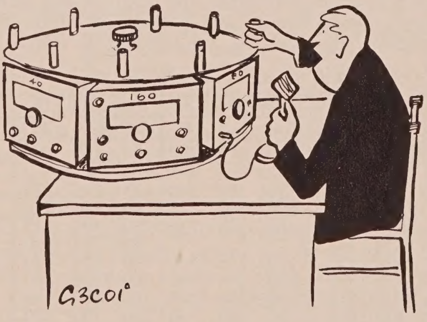
The cathodes of CR_1 and CR_2 should now be connected to the pin of S_{2B} from which the coax center conductor was removed. The pin which was originally connected to the coax shield should be grounded close to the switch.

The audio amplifier must also be slightly modified (see fig. 1). A 1.5 megohm resistor should be added in series with the audio line from the volume control. Make this addition at V_{17} itself, rather than at the volume control. The added resistor tends to keep the sidetone volume constant regardless of the setting of the receiver volume control.

In the TR-3, the VOX relay has an extra set of contacts which is also utilized. Once the VOX relay is energized, these contacts (pins 5 and 8 of J_3, the power plug) ground the collector of Q_2. This keeps K_1 energized as long as the VOX relay is pulled in, with the advantage that K_1 does not pull in with every closure of the key. This feature is not really necessary, but it does prevent unnecessary switching of K_1.

The author's version of this break-in system was constructed on a small circuit board and installed inside the TR-3. Although actual circuit layout is not critical, good r.f. shielding and bypassing procedures should be employed. Shielded cable should be used in making connections to both VOX and audio inputs. K_1 was glued to the top of the chassis close to S_2.

This circuit was designed for the TR-3, but it should work with similar transceivers with only minor (if any) modifications. ■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160
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G3COI

"The band changing system here is quite unusual..."

FCC Proposes Widening of Phone Bands

Before the
FEDERAL COMMUNICATIONS
COMMISSION
Washington, D.C. 20554

In the Matter of Amendment of Part 97 of the Commission's Rules to provide for expansion of the telephony segments of the high frequency amateur bands.

DOCKET NO. 19162
RM-1306, RM-1349,
RM-1477, RM-1479,
RM-1544, RM-1550,
RM-1593, RM-1603,
RM-1614, RM-1616,
RM-1644, RM-1665,
RM-1695, RM-1723,
RM-1729.

NOTICE OF PROPOSED RULE MAKING
Adopted: February 24, 1971
Released: March 1, 1971

By the Commission:

1. On September 24, 1969, the Commission adopted an Oredr (FCC 69-1020), which affirmed the implementation on November 22, 1969, of high frequency band "incentive" telephony allocations for Amateur Extra and Advanced Class licenses previously adopted in Docket 15928. Expansion of the total space available in the high frequency bands for telephony was not considered in that proceeding. Fourteen petitions and a number of letters have been received which request expansion of one or more of the amateur high frequency telephony sub-bands. One petition proposes reduction of telephony space.

2. Petition RM-1349 proposes expanded phone bands for United States licenses in Puerto Rico, Guantanamo Bay and the Virgin Islands without regard to license class. RM-1603 urges phone band expansion and early action on RM's 1306, 1477, 1479, 1544 and 1550. RM-1616 proposes phone band expansion and abolishment of exclusive bands for Advanced and Extra Class operators. RM-1695 proposes 50 kHz additions to the present phone bands for only net operation without change to the current segments reserved for Advanced and Extra Class operators. Reduction of the present 14 MHz telephony sub-band to 14.225-14.350 MHz is proposed in RM-1723. Of the remaining ten petitions, all propose additional exclusive space for Extra Class; seven propose additional reserved space for Advanced and Extra Class, and; seven propose expansion of the telephony space available to Conditional and General Class operators. In addition to RM-1616, RM's 1550, 1593 and 1614 would make the space available to General and Conditional Class equal to that which was available prior to the implementation of Docket 15928. A tabulation of the total kHz now allocated and requested follows:

[table below]

3. In most cases, the proposed General-Conditional Class operator segments extend downward from the top edge of each amateur band with an adjacent Advanced-Extra reserved band next below and the Extra-only band at the low end of a contiguous group of telephony sub-bands, in the same pattern as the current telephony bands. However, a 7075-7100 kHz telephony band was proposed for Extra only (RM-1644), for Extra and Advanced (FM-1655); 7100-7150 kHz for telephony nets (RM-1695); 7075-7150 kHz for Puerto Rican telephony (RM-1349), and; 3525-3600, 7025-7050 kHz for telephony by Extra Class operators only (RM-1614).

4. Some petitioners proposed conditions on the use of the added telephony segments such as: 1) limitation of contracts to "DX" stations (other countries) only (RM-1306, 1477); 2) limitation to use of single sideband emission only (RM-1477, 1644, 1695); 3) maximum of 150 watts input power (RM-1306); 4) maximum of one kilowatt (kw) output power for Advanced Class and 1.5 kw output for Extra Class (RM-1665). RM-1593 would allow Advanced Class to use telegraphy in the exclusive Extra Class telephony bands. Most petitioners would move the Novice telegraphy bands downward without change in bandwidth to make way for the telephony expansion proposed. However, in excep-

A = Advanced Class   C = Conditional Class   E = Extra Class   G = General Class

Band:	3500-4000 kHz			7000-7300 kHz			14,000-14,350 kHz			21,000-21,450 kHz			28,000-29,700 kHz		
Class:	G,C	E,A	E	G,C	E,A	E	G,C	E,A	E	G,C	E,A	E	G,C	E,A	E
Current kHz:	100	175	200	50	100	100	75	150	150	100	175	200	1200	1200	1200
RM-1306							75	150	200	100	175	250			1500
RM-1349	250	250	250	125	125	125	250	250	250	350	350	350	1600	1600	1600
RM-1477	100	200	225	50	150	150	75	200	200	100	250	250	1200	1300	1300
RM-1479	100	175	225	50	100	125	75	150	175	100	175	250			
RM-1544				50	75	100	75	150	200	200	225	250			
RM-1550	200	225	250	100	125	150	150	175	200	200	225	250			
RM-1593	200	275	300	100	150	150	150	225	225	200	200	225			
RM-1614	200	200	275	100	100	125	150	200	200	200	250	250			
RM-1616	300	300	300	200	200	200	250	250	250	200	200	200			
RM-1644	175	225	250	100	150	150	75	150	200	150	200	250	1200	1500	1500
RM-1665	200	225	250	100	100	125	150	200	250						
RM-1695	150	225	250	100	150	150	125	200	200	150	225	250			
RM-1723							100	125	125						
RM-1729	200	275	300	100	150	150	150	200	200	150	225	250			

tion to just shifting the Novice space, 28.1-28.2 MHz is proposed in lieu of 21.1-21.25 MHz (RM-1306, 1644) and/or reduction of the 21 MHz band to 21.1-21.2 MHz is proposed (RM-1479, 1644). A 50 kHz over-lap of the Novice and the net allocation would be permitted by RM-1695. The effect of RM-1616 would be to eliminate the current exclusive Extra Class telegraphy segments while RM-1665 proposes reductions to 3500-3510, 7000-7005 and 14000-14005 kHz. In RM-1665, 3510-3525, 7005-7010 and 14005-14010 kHz is proposed for exclusive Advanced and Extra Class telegraphy operation. In RM-1614, 21000-21025 kHz is proposed for Advanced as well as Extra Class telegraphy operation. The 50 kHz telegraphy Extra Class segments, proposed in RM-1479, were rejected in the Commission's Order (FCC 69-1020) adopted September 24, 1969. The matter of credit for certain amateur examination elements proposed in RM-1477 for holders of Commercial operator licenses will be considered in a separate proceeding.

5. Except as noted, these petitions are based on the purpose of providing more operating room in the high frequency telephony sub-bands for all operator classes and/or providing further incentive to obtain the Advanced Class and the Extra Class operator licenses. One of the petitioners said daily listening indicates ". . . that the division of frequency spectrum between radiotelephone and CW (telegraphy) is very inequitable, based on the number of stations using each mode and the bandwidths required." He also stated, "The emphasis of the Extra Class license privileges should not be heavily weighted towards CW as is now, but should provide more opportunity and incentive for the amateur who is interested in other modes of transmission."

6. In evaluating the effect of the first phase of the incentive licensing (Docket 15928) program and of the second phase,[1] the Commission considered correspondence, license statistics, petitions, and occupancy surveys of the reserved sub-bands. In addition to observation of the relative occupancy of portions of the bands adjacent to the Extra and the Extra-Advanced reserved sub-heads, the overall relative occupancy throughout each of the amateur high frequency bands was studied. These observations were made during periods of moderate and heavy occupancy of the band being studied. During such periods, the telephony sub-bands were invariably much more heavily occupied than were the segments remaining for telegraphy. This was determined with a receiver of good selectivity for each mode of operation. Beginning with the 7 MHz band and becoming progressively more pronounced up through the 28 MHz band, it was evident that, in each band there was a territory of significantly reduced activity between the more popularly used lower 100 kHz of the telegraphy segment and the telephony sub-band. With the exception of the 7 MHz and 21 MHz Novice segments, there was very little telegraphy operation therein by U.S. amateurs, the occupancy being almost wholly by foreign amateurs using telephony. Even during periods of greatest activity, the foreign telephony station occupancy of these segments appears to be relatively light. The observations also revealed that occupancy of the 25 kHz Extra Class reserved telegraphy segment was low even during times of high telegraphy activity on adjacent frequencies.

7. Heretofore, there has been opposition to such telephony sub-band expansion by telegraphy proponents on the basis that the foreign amateurs using telephony would shift downward and cause severe interference in the informally, but internationally recognized exclusive telegraphy segments.[2] Since the use of single sideband suppressed carrier techniques by foreign amateur telephony stations has become predominant, destructive interference to telegraphy from telephony carriers is no longer a significant factor. In fact, it appears that foreign amateurs using suppressed carrier telephony now avoid the popular telegraphy segments apparently because of the interference suffered from telegraphy in receivers being operated for reception of suppressed carrier telephony.

8. The Commission believes that some expansion of the amateur high frequency telephony sub-bands is desirable. The encouraging result of the present license class–frequency allocation incentive system indicates that its continuation in approximately the same pattern is warranted. This is predicted upon provision of an attractive advantage of operating space to number of licensees ratio for the Advanced and Extra Class operators. Therefore, appropriate amendment of the Amateur Radio Service Rules is proposed as set forth in the attached Appendix. Generally, an exclusive 25 kHz segment for Amateur Extra Class operator is provided at the low end of each telephony sub-band. The modest number of United States licenses of this class should not significantly affect foreign telephony operation therein and the greater possibility of establishing foreign contacts should be an incentive to qualify for the Extra Class license. With the exception of the 7 MHz band, expansion of each of the current Extra-Advanced Class reserved sub-bands is proposed. Expansion of current General-Conditional Class sub-bands is proposed in four bands. Expansion of the 28 MHz telephony sub-band to provide a similar pattern of Extra and Extra-Advanced telephony sub-bands is proposed. Appropriate modification of the 7 and 21 MHz Novice sub-bands is included. A 28 MHz Novice band is proposed as compensation for the proposed reduction in the 21 MHz Novice band. Because of the light occupancy in the current 25 kHz Extra Class telegraphy segments, reduction of each to 10 kHz is proposed.

9. The requested limitation of Extra or Advanced Class operation to low power, "SSB" emission and to only international contacts is not proposed herein. The petitioners gave no reasons for proposing such limitations and it is the Commission's view that some of the limitations would serve to reduce the attractiveness of the sub-bands to would-be Extra Class and Advanced Class licensees. Since there is so little

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[1] Order, FCC 69-1020, adopted September 24, 1969.

[2] The regulations of most countries permit the use of telephony throughout each high frequency amateur band. The International Amateur Radio Union has adopted a set of voluntary sub-allocations (*QST*, November, 1969, page 81).

double sideband telephony operation left in these bands, the imposition of a limitation to the use of only single sideband suppressed carrier appears to be unnecessary. The limitation to only international contacts would be difficult to comply with and enforce in many situations such as, for example, a multilateral exchange of communications among a foreign station and two or more United States stations.

10. The request for additional telephony space for use by the amateurs of the Commonwealth of Puerto Rico appears to be designed primarily to allow them to operate with telephony on frequencies where many Spanish speaking amateurs of other countries are most likely to be operating. It would also obviously permit freedom from the heavier interference from amateur telephony stations in the 50 states. However convenient this might be, it is believed that Puerto Rican licenses should also be encouraged to up-grade their license class and the allocations proposed herein will provide some of the benefits desired by the petitioner, to those who are willing to exert the effort to obtain the higher class licenses. It is also believed desirable to encourage more communication between the citizens residing in the Commonwealth and in the 50 states.

11. The requested use of 1875-1900 kHz in Puerto Rico (RM-1349) is not possible because of United States Coast Guard requirements for protection of the LORAN system of navigation which which amateur sharing of the band must be on a non-interfering basis. 1800-1850 and 1975 to 2000 kHz is available for telephony and telegraphy in Puerto Rico.

12. In Regions 1 and 3 (as defined by the International Radio Regulations, Geneva, 1959) 7100-7300 kHz is not allocated to the Amateur Radio Service. Appropriate amendment of the operator privileges, making provision for a substitute Novice sub-band and a telephony sub-band for U.S. licensees located in the far Pacific Island possessions in Region 3, is included. Recognizing that off-frequency telephony contacts with stations in Region 1 or 3 operating below 7100 kHz may be more difficult for U.S. stations operating above 7150 kHz, provision for the exchange of telephony communications with stations outside Region 2 is proposed at 7075 to 7100 kHz for Advanced and Extra Class operators as an incentive to encourage qualification for these classes.

13. The specific rule changes proposed herein are set forth in the attached Appendix. Authority for these proposed amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended.

14. Pursuant to applicable procedures set forth in Section 1.415 of the Commission's Rules, interested persons may file comments on or before June 1, 1971, and reply comments on or before June 18, 1971. In accordance with the provisions of Section 1.419(b) of the Commission's Rules, an original and fourteen copies of all statements, briefs, and comments shall be furnished the Commission. All relevant and timely comments and reply comments will be considered by the Commission before final action is taken. The Commission may also take into account other relevant information before it, in addition to specific comments invited by this Notice.

FEDERAL COMMUNICATIONS COMMISSION
Ben F. Waple
Secretary

APPENDIX I

Petitioners

RM-1306	Richard Ebeling, K2UTC, White Plains, New York
RM-1349	Radio Club de Puerto Rico, Jose E. Saldana, President, San Juan, Puerto Rico
RM-1477	Lowell E. White, W2CNQ, Closter, New Jersey
RM-1479	Paul H. Lee, W3JM, Kensington, Maryland
RM-1544	Bernard Ostrofsky, W9HTF, Gary, Indiana
RM-1550	Andrew G. Bourassa, WA1LJJ, Laconia, New Hampshire
RM-1593	Joseph Santangelo, W1NXY, Waltham, Mass.
RM-1603	Paul H. Lee, W3JM, Kensington, Maryland
RM-1614	R. L. Cope, W8MOK, Marion, Ohio
RM-1616	Kenneth H. Dearborn, K6EVO, et. al.
RM-1644	J. S. Brown, W9IPK; Wallace H. Raymond, K4EKJ; C. Everett Coon, W2KNU/4; Gary O. Poorman, W4UPJ; W. I. Bull, W4TRI, and; L. M. Rundlett, W3ZA
RM-1665	David W. Clements, WA6FHB, FBO, New York
RM-1695	Charles R. Clark, WB4OBZ, Moncks Corner, South Carolina
RM-1723	George E. Cushing, W4QVJ, Hollywood, Florida
RM-1729	Gary A. Stillwell, W6NJU, Canoga Park, California

APPENDIX II

Amendment of Part 97 of the Commission's Rules is proposed as follows:

1. Section 97.7 (a) and table, paragraph (b), and subparagraph (d) (2) are amended to read as follows:

§97.7 Privileges of operator licenses.

(a) *Amateur Extra Class and Advanced Class.* All authorized amateur privileges including exclusive frequency operating authority in accordance with the following table:

Frequencies	*Class of license authorized*
3500-3510 kc/s	Amateur Extra Only
3750-3775	
7000-7010	
7150-7175	
14000-14010	
14150-14175	
21000-21010	
21200-21225	
28350-28375	
3775-3875 kc/s	Amateur Extra and Advanced
7075-7100	
7175-7225	
14175-14250	
21225-21325	
28375-28500	
50.0-50.1 Mc/s	

[*Continued on page 98*]

CQ Reviews:
The Tempo I Transceiver

BY WILFRED M. SCHERER,* W2AEF

A RECENTLY introduced piece of gear that has aroused much interest is the Tempo I SSB/CW Transceiver. This is an amateur-band-only job (3.5-28 mc) with the usual type of identical linear-tuning rate for each band over a 500 kc increment. Other features that are expected of a good transceiver include the customary facilities of u.s.b. or l.s.b. selection, preselection tuning, frequency calibration in 1 kc steps, receiver off-set tuning, adjustable output loading, a.l.c., 100 kc crystal calibrator, a.n.l., full metering (for a.l.c., p.a. plate current, relative output power and receiver S-meter), built-in v.o.x. or p.t.t. operation, c.w. keying with waveshaping and break-in with v.o.x. system, panel switching for engaging an external v.f.o. for split-frequency operation, c.w. sidetone monitor, carrier insertion for a.m. transmissions, accessory power socket, provisions for controlling a linear amplifier, operation from 120/240 v.a.c. or 12 v.d.c. source obtained from individual external power supplies for the particular type of source.

Technical Highlights

The Tempo I employs 16 vacuum tubes, 15 semiconductor diodes and 7 transistors. It is quite a straight-forward setup with no special tricks involved. A block diagram is shown at fig. 1. Although not a new concept, but unlike many transceivers, this unit employs single conversion to a 9 mc i.f. with the necessary heterodyning signals supplied directly from a 5.0-5.5 mc v.f.o. or by "premixing" the v.f.o. output with a crystal-controlled signal. Not only does this setup reduce costs, but it also eliminates additional mixing of the s.s.b. signal which otherwise would be required. This minimizes the possibility of signal distortion or certain spurious responses.

Selectivity and sideband selection are obtained using a 9 mc crystal-lattice filter that has a 2.3 kc bandpass and a 6-60 db shape factor of a little under 1.75. As may be seen from the measurements results given later, better-than-usual unwanted sideband suppression is thus realized.

The product detector is a triode type with the b.f.o. signal applied to the cathode, the i.f. signal to the grid. A.g.c. is obtained with a triode that functions both as an a.g.c. detector and amplifier. A fast attack and moderately-slow release are provided. The a.n.l. is an a.f. type using two diodes. It may be switched on or off. A.f. output power for an external 8-ohm speaker is rated at 1 watt at 10% distortion. A jack on the panel provides output for headphones and cuts off the speaker during such use. There also is a 600-ohm output.

Transmitter

An R-C filter at the speech input minimizes the possibility of r.f. feedback that might otherwise be due to pickup by the mic cable. The balanced modulator is a 7360 used in the conventional manner. The r.f. signal, of course, is generated at 9 mc. The crystal filter and the 1st i.f. amplifier are common to both the receiver and transmitter. The signal from the latter goes to the transmitter mixer where it is combined with the heterodyning signals from the common oscillator-premixer.

Grid- and plate-parasitic suppressors are employed at the 12BY7 driver. The receiver preselector-tuning circuits are also used for

The Tempo I SSB/CW Transceiver.

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*Technical Director, *CQ*.

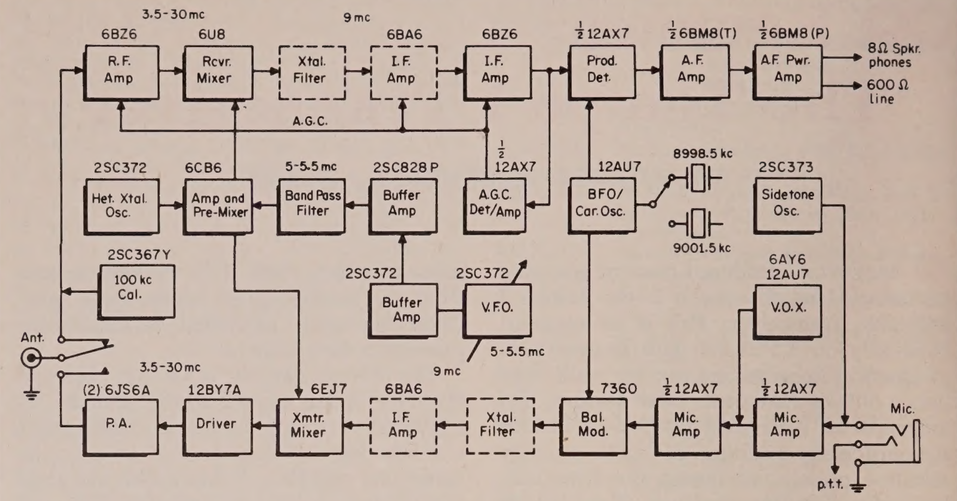

3.5-30 mc
6BZ6
R.F. Amp
6U8
Rcvr. Mixer
9 mc
Xtal. Filter
6BA6
I.F. Amp
6BZ6
I.F. Amp
½ 12AX7
Prod. Det.
½ 6BM8(T)
A.F. Amp
½ 6BM8 (P)
A.F. Pwr. Amp
8Ω Spkr. phones
600 Ω line
A.G.C.
2SC372
Het. Xtal. Osc.
6CB6
Amp and Pre-Mixer
5-5.5 mc
Band Pass Filter
2SC828 P
Buffer Amp
½ 12AX7
A.G.C. Det/Amp
12AU7
BFO/ Car. Osc.
8998.5 kc
9001.5 kc
2SC373
Sidetone Osc.
2SC367Y
100 kc Cal.
2SC372
Buffer Amp
2SC372
V.F.O.
5-5.5 mc
6AY6
12AU7
V.O.X.
Ant.
3.5-30 mc
(2) 6JS6A
P.A.
12BY7A
Driver
6EJ7
Xmtr. Mixer
9 mc
6BA6
I.F. Amp
Xtal. Filter
7360
Bal. Mod.
½ 12AX7
Mic. Amp
½ 12AX7
Mic. Amp
Mic.
p.t.t.

Fig. 1—Block diagram for the Tempo I. Sections outlined with dashes are common to both receiver and transmitter. Technical highlights are given in text. Items identified as 2SC . . . are Japanese transistors.

the transmitter-driver input and output. The p.a. operates in class AB2. Parasitic suppressors are engaged at the grid and plates and capacitance-bridge neutralization is utilized. The output circuit is a conventional Pi-type with adjustable loading for impedances representing less than a 2:1 s.w.r. related to 50 ohms. A.l.c. is obtained in the usual manner with two diodes in a voltage-doubling setup driven by the a.f. component of grid current occurring at the overdrive point.

Oscillators

The 5.0-5.5 mc v.f.o. is transistorized as are a v.f.o. buffer and amplifier following which is a bandpass filter that minimizes spurious responses. For 3.5 and 14 mc operation the v.f.o. signal and the 9 mc signal at the receiver and transmitter mixers are subtractive and additive respectively. For operation on the 7, 21 and 28.5 mc ranges, the v.f.o. output is combined in a premixer with the signal from a crystal-controlled oscillator at frequencies of 11, 35.5 and 43 mc respectively. The sum of the crystal frequency for 7 mc and that of the v.f.o. provides the necessary mixer-injection signals for that band, while the difference frequencies are used for the 21 and 28.5 mc ranges.

The injection frequencies for 7 mc then are 16-16.5 mc (11 mc plus 5-5.5 mc), for 21 mc they are 30-30.5 mc (35.5 mc minus 5.5-5.0 mc) and of the 28.5 mc range they are 37.5-38 mc (43 mc minus 5.5-5 mc).

The band frequency is obtained by subtracting the injection frequencies from 9 mc where the 3.5 and 28.5 mc ranges are used. For the other bands 9 mc is subtracted from the injection frequencies. Tuning on the 3.5 and 28.5 mc ranges thus goes in the opposite direction to that for the other bands.

The b.f.o. or carrier generator employs a dual triode each selection of which functions as a separate crystal-controlled oscillator at frequencies 3 kc apart. The oscillators are individually switched on or off as needed for the frequency that places the signal at the side of the filter required for l.s.b. or u.s.b. operation.

A sideband switch on the panel has a NORMAL-SIDEBAND position that selects l.s.b. operation for the 3.5 and 7 mc bands, u.s.b. operation for the other bands. A REVERSE-SIDEBAND position of the switch selects the opposite sideband which is not normally used for the particular band. When sidebands are changed by switching in the different b.f.o. frequencies, the frequency of the v.f.o. is not accordingly compensated. The v.f.o. then must be retuned 3 kc in the required direction.. For the 28 mc band, the set is supplied with a crystal for only 28.5-29 mc operation; however, crystal sockets and switching are provided for operation on any or all of the other 500 kc segments required for this band.

The 100 kc crystal calibrator is transistorized.

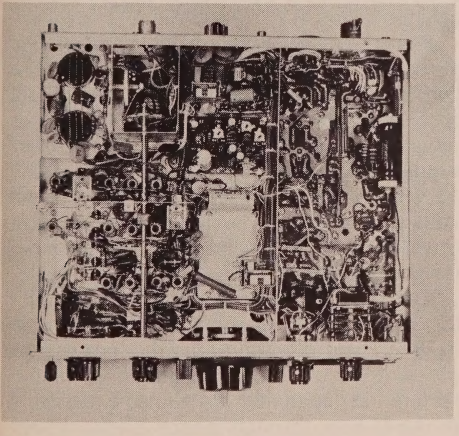
C.W. Operation

For c.w. and tuneup, the modulator is unbalanced by a d.c. potential, thus supplying an r.f. carrier signal. At the same time a diode switch changes the capacitance across one of the crystals at the carrier generator. This shifts the frequency to within the passband of the filter, allowing the carrier to pass unattenuated. A control ganged to the mic gain adjusts the tuneup carrier, while a screwdriver-adjust control at the rear of the set is provided to set the carrier for c.w. or a.m. use.

Block-grid keying is used, and for break-in the sidetone oscillator, which is simultaneously keyed, actuates the v.o.x. system. This oscillator is a transistorized phase-shift type with a 1500 c.p.s. tone; however, this can be varied somewhat by an internal control. The sidetone level is adjusted by a control ganged to the mic gain. A conventional type of v.o.x. system is employed, the controls for which are screwdriver-adjust types at the rear of the set.

Other facilities

A panel switch selects the various meter functions, while another switch provides for normal transceive operation or frequency control with an accessory v.f.o. of either the transmitter or receiver for split-frequency operation. Receiver off-set tuning, especially desirable with c.w. work, is available with a CLARIFIER control on the panel. It varies the frequency of the v.f.o. ±5 kc by means of a Varicap diode.



Bottom view of the Tempo I. The unit is sturdily built with components readily accessible for servicing.

Tuning is accomplished with a high-ratio drive providing a coverage of 15 kc with one revolution of a spinner-type knob. A circular dial, calibrated in 1 kc steps from 0-100, has two rows of numerals at each 10 kc point. The figures at the top row are black, and the lower ones are red. They progress in opposite directions as stated previously for the various bands and are used in accordance with related black or red range figures at the bandswitch. Another circular dial has the 100 kc intervals identified at the left and right of the dial. These, too, run in opposite directions and are marked in black or red for proper correlation. These scales are observed through separate windows at the left and right. A dial locking setup is provided for setting the vernier dial position for proper indexing against the calibrator signals.

Performance

With s.s.b. signals of S-9 or more, distortion at the lower voice frequencies was evidenced. The cause was found to be too large an i.f. signal into the product detector, requiring a large reduction in the r.f. gain to clean it up.[1] The a.g.c. attack also was quite hard and the release somewhat faster than desirable, the latter resulting in some dynamic a.g.c. distortion of the signal. Shunting C_{126} with .22 or .33 mf, softened the attack and increased the release time to about 2 secs. for full recovery.

Good voice quality on s.s.b. transmissions was reported during on-the-air tests. C.w. keying was soft, but not enough so to cause hesitant dots or "lispy" attacks. As a consequence. key clicks were not experienced. Break-in with v.o.x. for c.w. worked out well without any noticable shortening of a dot or dash or hesitation on the pickup.

Measurements on a Tempo I provided the following results (figures in parenthesis are the manufacturer's ratings where given):

Receiver—SENSITIVITY: (0.5 μv)—0.33 μv

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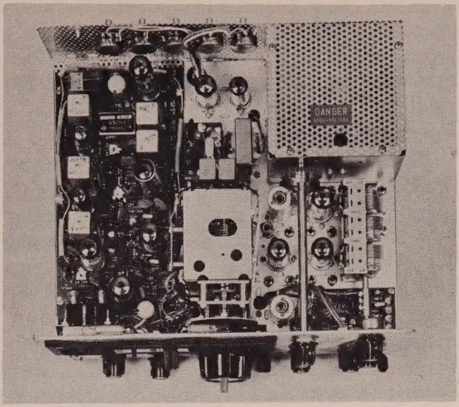
[1] Our model was an early production unit. It is understood that the manufacturer has rectified the situation in subsequent units. Where this difficulty is experienced by present users of the equipment, modification information is available from Henry Radio.



Top interior view of the Tempo I. The v.f.o. is at center foreground. The b.f.o., i.f. and a.f. stages are on a circuit board at the left. The pre-mixing-crystal oscillator is on a board at lower right corner. The p.a. is in the enclosure at upper right.

or better for 10 db S+N/N; Unwanted-Sideband Suppression: (50 db at 1 kc)—with normal sideband position in use, 80 db at 1 kc, 65 db at 0.5 kc—with reverse-sideband position in use, 70 db at 1 kc, 40 db at 0.5 kc. Image Rejection: (50 db)—70 db on all bands, except 80 db on 28 mc; 9 mc I.F.-Signal Rejection: (50 db)— 48 db on 7 mc, 90 db on 28 mc, 60 db on other bands; Internal Spurious Tweets:—1 μv equivalent at 21.2 and 28.8 mc, 4 others elsewhere of .05 μv or less; Band-To-Band Gain, referred to 14 mc:—+5, +6, 0, +5, +3 db on 3.5, 7, 14, 21, 28 mc bands respectively with respective S-9 readings with signal inputs of 40, 35, 71, 40, 100 μv; A.g.c.—A.f. output change of 16 db with 20 db r.f. input change (1-10 μv), 7 db output change with 80 db input change (10-100,000 μv), release time of 1 second to full recovery; A.n.l.:—12-15 db attenuation of S-9 impulse noise; Overall Response, with normal S.B.:—450-1450 c.p.s. at 6 db, 300-2700 c.p.s. at 20 db, with reverse s.b. 400-1350 c.p.c. at 6 db, 200-2500 at 20 db; R.F. Intermodulation Products:— equal to that of average vacuum-tube jobs.

Transmitter: R.F. Output (with nominally rated input of 240 watts d.c., 300 watts p.e.p.) —125, 140, 135, 135, 125 watts d.c. on 3.5, 7, 14, 21 and 28 mc respectively, approximately 15% higher at p.e.p., low output on 3.5 mc is representative of that obtained at upper end of band where full loading into a 50-ohm dummy was unobtainable; 3rd-Order Distortion Products: (−30 db)—at a.l.c. threshold 32 db below peak amplitude of two test tones, 5th order—38 db down; Carrier Suppression: (40 db)—45 db; Unwanted-Sideband Suppression: Same as receiver—as previously noted this is greater than usually found; Overall Response:—600-2300 c.p.s. at 3 db, 520-2500 c.p.s. at 6 db, 400-2600 c.p.s. at 10 db, 250-2700 at 20 db using normal sideband, above figures with reverse sideband approximately 150 c.p.s. lower; A.l.c. Control was very good.

Frequency Stability: (100 c.p.s. in any 30-minute period after warmup)—The warmup period was about 1 hour as indicated by the results of several runs where a uniform and steady drift from a cold start at 78°F. ambient averaged 170 c.p.s. during each 5-minute period for the first hour for a total of a little over 2 kc and the end of this period.[1] The frequency then settled down to 50 c.p.s. or less per hour thereafter.

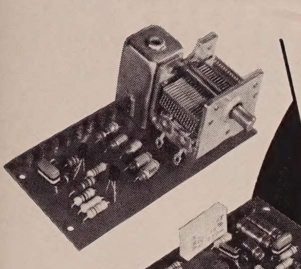
With ±10% line voltage variation the frequency held to within ±2 c.p.s. Excellent stability was experienced under mechanical stress.

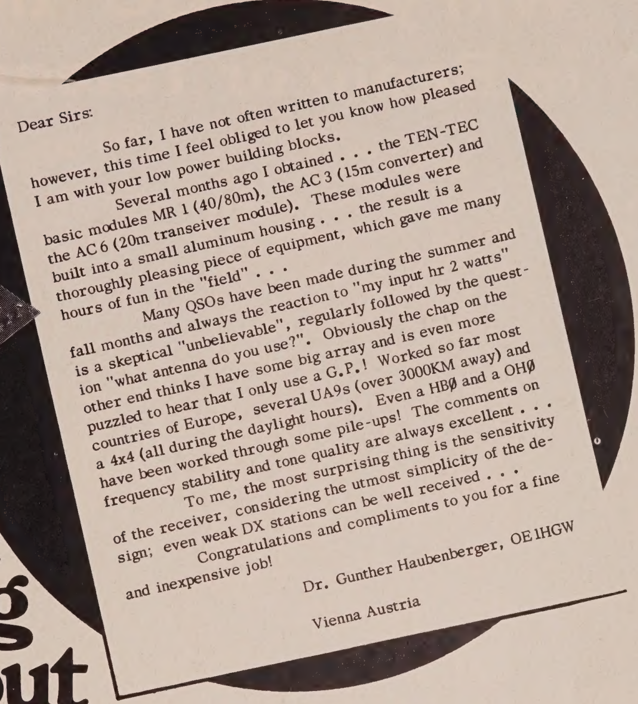
Dial calibration linearity was within 0.5 kc at the 25 kc points when indexed at nearest 100 kc calibrating signal. The red numerals on the 0-100 kc vernier are not easily seen over a wide range and the windows for the 0-500 kc dial scales are quite small, both situations making frequency observations difficult from some operating positions.

The size of the unit is 5½″ × 13¼″ × 11″ (H.W.D.) and it weighs 17½ lbs. A carrying handle is provided at one side of the cabinet.

Power requirements are 12 v.a.c. or d.c. at 6 a., +150, 300, 600 and −100 v.d.c. The current drain for the high voltages is not specified in the manual; however, the proper requirements are met by the AC-1 a.c. power supply and speaker console and the DC-1 12 v.d.c. supply. A transistorized electronic voltage regulator is included in the transceiver to provide 9 volts operating potential for the transistors.

The Tempo I transceiver is priced at $298.-00. The AC-1 power supply/speaker console is $99.00 and the DC-1 12 v.d.c. power supply is $107.00. This equipment is manufactured in Japan and distributed exclusively in the U.S.A. through Henry Radio, 11240 W. Olympic Blvd., Los Angeles, California 90064. *—W2AEF*





Dear Sirs:

So far, I have not often written to manufacturers; however, this time I feel obliged to let you know how pleased I am with your low power building blocks.

Several months ago I obtained . . . the TEN-TEC basic modules MR 1 (40/80m), the AC 3 (15m converter) and the AC 6 (20m transeiver module). These modules were built into a small aluminum housing . . . the result is a thoroughly pleasing piece of equipment, which gave me many hours of fun in the "field" . . .

Many QSOs have been made during the summer and fall months and always the reaction to "my input hr 2 watts" is a skeptical "unbelievable", regularly followed by the question "what antenna do you use?". Obviously the chap on the other end thinks I have some big array and is even more puzzled to hear that I only use a G.P.! Worked so far most countries of Europe, several UA9s (over 3000KM away) and a 4x4 (all during the daylight hours). Even a HB0 and a OH0 have been worked through some pile-ups! The comments on frequency stability and tone quality are always excellent . . .

To me, the most surprising thing is the sensitivity of the receiver, considering the utmost simplicity of the design; even weak DX stations can be well received . . .

Congratulations and compliments to you for a fine and inexpensive job!

Dr. Gunther Haubenberger, OE1HGW

Vienna Austria

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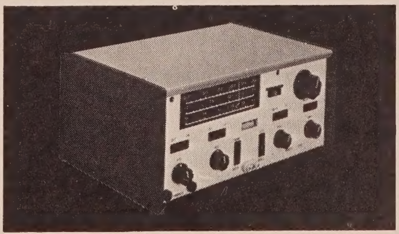

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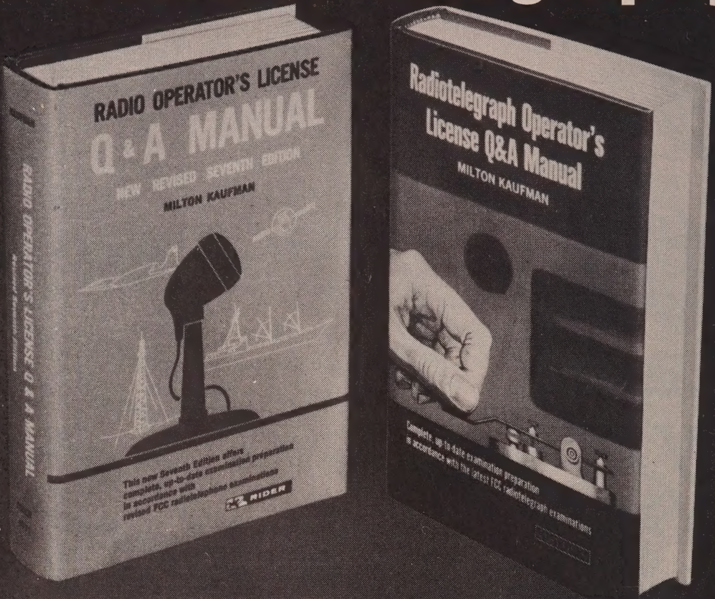
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F.M.

BY GLEN E. ZOOK,* K9STH/5

ONE of the things which I promised in the first F.M. COLUMN was an occasional review of f.m. and f.m. related equipment. Some items, such as f.m. transceivers lend themselves better to a separate article, which have been printed in the February, March, and April CQ. Other items do not lend themselves readily to a full length article. Such items are the 20-176 and 21-901 antennae marketed by Allied Radio Shack. These antennae were originally designed for the Citizens Band and v.h.f. f.m. public service bands for monitor and low power transmitter use. The 21-901 is a low-band ground plane type of antenna, and the 20-176 is a high-band and u.h.f. ground plane antenna. The 21-901 is constructed from aluminum rod and good quality steel hardware. The original design was for CB, but the antenna comes with a cutting chart which includes the frequencies from 25 to 55 mc. The three radials and the vertical radiator assembly are in two sections. The inner section mounts to an "L" bracket for mounting purposes. The outer sections have adaptors which mate with the threaded ends of the inner sections. The length of the inner sections is just about right for six meter operation, and the full length has to be trimmed only slightly for operation on ten meters. Although the antenna has been used primarily for 5 watt CB operation, the construction is such to allow much higher power. The antenna will accept the normal f.m. power levels up to at least 100 watts (I tried the test antenna with my SB401-SB-200 combination at about 600 watts output in dry weather) and probably more.

The 20-176 antenna is designed for 150 through 470 mc.. It is primarily of steel construction with a chrome plated radiator and three radials. The radials are sufficiently long for two meter operation, but the vertical radiator is too short. It can be lengthened the insertation of a rod of approximately 1/4" in diameter of the proper length. This antenna should also take the normal amateur power levels up to 100 watts output.

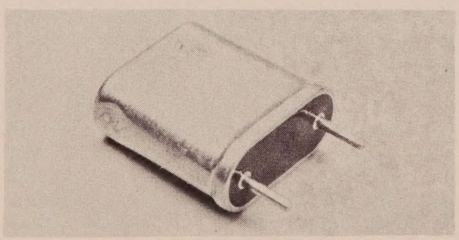
Both antennae include mounting hardware and have the usual u.h.f. connector (SO-239) for the connection of 50 ohm coax. Although these antennae do not have any gain, they are quite suitable for local direct and repeater use. Many amateurs have constructed ground plane antennae for ten, six, and two meters and are using them with satisfactory results. Other amateurs have modified other types of antennae to produce the same results. Thus, for the amateur needing the type of performance from the ground plane type of antenna, the 20-176 and the 21-901 will fill that need. These antennae are available for $9.95 each from any of the Allied Radio Shack outlets or by mail order.

Technical Talk

Last month I promised to tell the secrets of changing the frequency of plated crystals of the type normally used in amateur and commercial f.m. equipment. Well, here it is.

First of all, it must be understood that the hermetically sealed HC6/U and similar crystals may, under most circumstances, be moved either up or down from 1/2 to 1 percent of the original frequency. Also, it has been my experience to lose about 1 out of 5 crystals either from breakage or loss of oscillation. However, this 20% or so loss is not objectionable, especially when considering that the crystals could not have been used otherwise. During all operations the crystal must be handled very carefully to keep from breaking it. Also, handling with the fingers is a no-no.

The first operation is to determine the frequency (either fundamental or at desired harmonic) at which the crystal oscillates in the desired circuit. Remember that the frequency stamped on the holder holds true only for one



A typical hermetically sealed crystal. Note the indentation near the upper left corner where an inert gas was injected before sealing.

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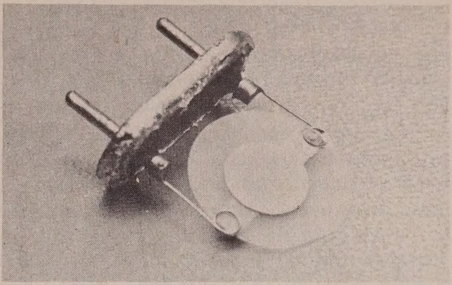
*818 Brentwood Lane, Richardson, Texas 75080.



The inside of the crystal. Metal must be added to or subtracted from the circular pads in the center of the quartz. It is very important to support the crystal at all times.

specific type of oscillator circuit, at given capacitance and current parameters. Carefully record this frequency and then decide which direction to go.

The next step is to open the crystal can. There are primarily two types of cans used. The first type has a cover which fits into a groove in the base of the assembly. The second type has the can fitting over the base. In both types the cover is soldered to the base. Secure the pins of the crystal in a vise or by inserting in a block of wood (vise much better). Then heat the can along the solder joint where the cover meets the base. It will be necessary to move the iron around the base several times until all solder is molten. Then carefully lift the cover off the crystal with a pair of pliers or with gloves. Be very careful to lift in a completely vertical motion to prevent damage to the crystal itself.

Once the cover has been removed, the basic crystal can be observed. Most crystals are round, but some are square. In all cases the crystals are supported by wire leads going to the base pins. These wires are attached to deposits of metal (usually silver) on each side of the crystal. By adding to, or subtracting from these metal deposits it is possible to change the frequency of the crystal.

The next step is to determine the effects which the can had on the crystal. Carefully insert the crystal into the oscillator and determine the change in frequency from the original measurement. This will be a slight increase in frequency. Record this change.

If the desired frequency is higher than the recorded frequency it will be necessary to remove a portion of this plating. This can be most easily done with a common pencil eraser (the one on the end of the pencil works best). Do not use an ink eraser because it removes too much at one time. Support the crystal against a thick catalogue or handbook. This is to insure support for the prevention of breakage. Place as little pressure as necessary to hold the crystal in place. The wire leads will give slightly, but be careful. Then take two or three swipes with the eraser on the metal pad. Then return the crystal to the oscillator for a check. The amount which the frequency changed will depend greatly on the amount of metal deposited on the pad and on the fundamental frequency of the crystal. The 29 mc receive (fundamental or overtone) crystals will move much farther than the 3 or 6 mc transmit crystals. If the original frequency was very close, take only one swipe at a time. Continue removing metal trying to keep the pad as even as possible. A slight circular motion of the eraser will usually do this nicely. Try not to go all the way through the pad. If necessary, turn the crystal over and work on the other pad. When the desired frequency is reached it will be necessary to continue slightly farther, by the amount which the crystal can affects the frequency. Then the crystal can be reassembled by resoldering the can to the base. Near the top of the can there is probably a hole which was filled with solder. This was used to place an insert into the crystal during original manufacture. After the base has been soldered in place it will be necessary to solder over this hole. This will produce a partial vacuum within the crystal can after it cools. This partial vacuum is not quite as good as the original hermetic seal, but does the job of protecting the crystal from moisture.

If it is necessary to go down in frequency this can be accomplished by the addition of metal to the pads. Some amateurs favor placing a dot of pencil lead (graphite) on the pads. However, this acts like dirt and should not be used. There are two ways of increasing the metal deposited on the pads. The simple way is to flatten the end of a piece of solder and wipe the solder across the pad. Make sure not to get any on the quartz. Again how far the crystal moves with each deposit will depend on how much metal is on the pad and on the frequency of the crystal. Bring the crystal to a frequency slightly higher than the desired frequency (the amount which the can affects the frequency). Then reassemble the crystal as outlined above.

If the crystal stops oscillating before reaching the desired frequency, clean it with either soap and water followed by a clear water rinse, or better with one of the various hydrocarbon or flourocarbon spray cleaners which leave no residue. This will usually restore oscillation. If not, forget it.

The second method of depositing metal on the pads is better, but much more complex. It is done by plating. Attach a low voltage d.c. source to the pins of the crystal (negative terminal to pads) and a silver source (positive terminal) contained in a glass jar. Pour in a solution containing silver, such as silver nitrate. Your local hobby store or silver plating shop can probably steer you to a better solution. Periodically remove the crystal from the solution, clean, and then test it for proper frequency. Within the solution the positive silver (Ag) ions travel from the silver solution to the negative charged crystal pads. This silver within the solution is replaced by ions from the silver source.

Again let me caution you to handle the crystal with great care. Don't be alarmed if you break the first few or lose the oscillation. Practice on a few which you don't mind losing.

Now, you ask where to get this type of crystal? Well, look in your junk box. Most f.m.'ers have acquired crystals from various sources. Next look at the surplus ads. Many companies offer crystals at small prices. Many of these crystals are just to one side of a good f.m. channel. Next look into the CB market. Did you know that the old 3rd overtone channel 1, 2, and 3 transmit crystals (as used in much of the older Heath, Knight, and other CB equipment) will hit or almost hit receive on 146.820 mc, 146.880 mc, and 146.940 mc in Motorola "G" receivers (crystal types R27 and RM 10)? By using these techniques it is possible to use a $1.50 crystal in place of a $7.00 one.

I can visualize Bob, my mailman, bending over from the weight of boxes of crystals sent to me for moving. Don't, for I do not have sufficient time to move everyone's crystal. Thus, I will refuse to move any crystals but my own. The purpose of this Technical Talk is to show you, the f.m.'er, how to do it yourself.

News

Again don't forget the Second Southeastern f.m. Convention which is being held in conjunction with the Orlando Hamfest. See last month's column for more details. The XYL keeps mentioning Florida, so I think that she is definitely planning on going. Thus, we will see you in Orlando.

The Texas VHF FM Society and its member organizations are attempting to formulate a plan on usage of the 420 through 450 mc band. The purpose of this plan is to prevent a hodge-podge arrangement as often occurs in the early development of amateur workings. I need information on how 450 is being used in other areas. The initial meeting of the Texas group was at the end of February, but more information is needed to provide a good plan. How about it f.m. world.

The Dayton, Ohio, f.m. group, the Miami Valley FM Association forwarded a copy of their newsletter and of a set of regulations and suggestions for use of their repeater (very well written). This is the type of information which helps out the f.m. Column. I would like to be placed on the mailing list of every f.m. bulletin in the USA and Canada. How about it.

Finally, Birmingham, Alabama, has a repeater operating on 146.34/146.94. This fills one of my holes going from Dallas to Atlanta. They request each operator to announce the time at beginning and end of each QSO, but that is a reasonable request.

A shot during the CARC February meeting. Les Cobb, W6TEE, Chairman of the Council is at the lectern. *(photo by W6ICX)*

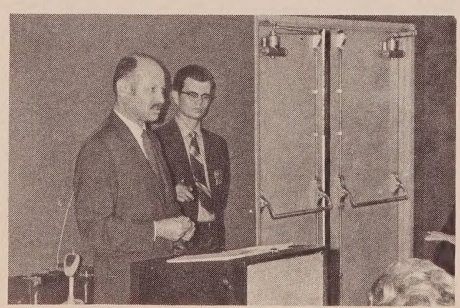
CARC February Meeting

The tri-annual meeting of the California Amateur Relay Council was held in Visalia, California, on February 6, 1971. About 100 persons attended. Two resolutions were presented to the council. The first resolution defined open and closed repeaters. The second resolution dealt with a recommendation as to what frequencies manufacturers should include in off-the-shelf equipment. A nutshell condensation of these resolutions is as follows:

1. Open repeater: One where use by any properly licensed amateur is encouraged. Frequent users may be expected to join the repeater organization or otherwise provide support to the continued operation of the repeater. An open repeater can require access tones if these tones or codes are made generally known. All repeaters operating on nationally or locally recognized "open" frequencies (e.g. .34/.94) will be considered open repeaters.

2. Closed Repeater: One which organization prefers that membership be obtained before operating extensively through the repeater.

[*Continued on page 90*]



Another view of the CARC meeting. Bob Kelty, WB6DJT, gave a presentation on the development of G.E. portable equipment. W6TEE, on the right, swears he was not eating the lemons.

CQ Reviews:
The Drake Marker Luxury 2M FM Transceiver

BY GLEN E. ZOOK,* K9STH

A RELATIVE newcomer to the f.m. fold is an old-timer in amateur radio equipment, R.L. Drake Company. The Drake contribution to the rapidly growing number of f.m. transceivers designed for the radio amateur is the Marker Luxury. This unit is manufactured for Drake in Japan and marketed stateside by Drake. The basic transceiver package contains virtually everything needed to establish a two meter f.m. station. The package contains the transceiver, dynamic microphone, mounting bracket, a.c. and d.c. cables (yes, this unit operates from either 120 v.a.c. or 13.5 v.d.c.), external speaker plug, and a Hustler, no-holes-type mobile antenna. The Marker Luxury differs from other amateur f.m. transceivers in that it uses one tube, a 6360, in the final amplifier. All other circuitry is solid state.

Technical Details

As stated before the Marker Luxury is a virtually completely solid state unit. Special features include provision for external speaker, relative signal and output meter (calibrated relatively from 0 to 5), and built-in a.c. and d.c. supplies. The unit is built on good quality circuit boards.

FM TRANSCEIVER
CHANNEL
Marker Luxury
VOL
SW ON
SIG PW IND
MIC
R.L. DRAKE COMPANY · Miamisburg, Ohio

The Drake Marker Luxury 2-meter f.m. transceiver is a 12 channel, base/mobile unit designed solely for amateur use, rather than being a variation on equipment designed for other services.

Receiver

The receiving section of the Drake Marker Luxury is fully solid state. JFET's are used in all amplifier and mixer circuitry above 455 kc. The front end is a neutralized cascode circuit. The first mixer (to 10.7 mc), the high i.f. amplifier, and the second mixer (to 455 kc) are also JFET. The low i.f. amplifier and 1st limiter are contained in a single integrated circuit. The second and third limiters are discrete semiconductor circuits. Audio detection is by the discriminator method. The squelch is noise derived and the audio circuits are conventional. Provision is made to warp both the high or 1st oscillator crystals and the low or 2nd oscillator crystal to insure on-frequency operation. A meter amplifier with a sensitivity adjustment is provided for front panel metering of relative signal strength. This meter is not calibrated in "S" units, so there will be no tendency for newcomers to give "30 over 9" readings off the repeater. Also included in the receiver section is a ceramic filter in the low i.f. and an external speaker jack. The receiver may be operated on up to 12 channels.

Transmitter

The transmitter of the Drake Marker Luxury is solid state up to and including the driver stage. The final is the proven 6360 dual tetrode. Crystal multiplication is 12 times, and provision is made to warp the transmit crystals. The audio stages are contained in a single integrated circuit. Modulation is true frequency modulation rather than phase modulation as used in most amateur and commercial f.m. equipment. The unit comes equipped with a 500 ohm dynamic microphone, but a carbon microphone may

---

*FM Editor, *CQ*.

be substituted if so desired. The instructions contain the necessary wiring changes for the microphone plug. The basic transmitter uses a transistor oscillator, followed by three stages of multoplication (triple, double, double) and a driver at the desired output frequency. Final amplification is in the 6360 and the output is applied through a low pass filter to the antenna through the change over relay.

Power Supply

The power supply of the Marker Luxury is similar to many CB rigs made both in Japan and in the United States. A single transformer is used to provide the B+ for the 6360. On a.c. the transformer also provides the 13.5 volts for operation (after rectification and filtering, of course) of the solid state circuitry. On d.c. a transistor oscillator is used to supply a.c. to the transformer, which in turn, provides only the B+ for the 6360. The d.c. for the transistors is provided by the battery of the vehicle.

Specifications and Performance

After the unit was received and unpacked it was immediately connected to a.c. and an antenna. Many contacts were made through the Ft. Worth, Texas, repeater on 146.34/146.94 mc. All reports on modulation quality were excellent. Many stations were received both direct and through the repeater. After several hours of operation the transceiver was put through its paces under controlled conditions. A box score of how the unit rated against its published specifications appears at the end of this section. The receiver checked out very well. The sensitivity for 20 db quieting was a very respectable 0.2 microvolts. The two crystals included in test unit (146.94 and 146.76 mc) were within 1.5 kc of the desired center frequency. This was within the 0.001% specified by Drake. A total of eight spurious responses were found within the range of 120 to 180 mc, but all of these responses except one were well below the −60 db response set by Drake. The eighth response was about 65 db down, but the frequency was a little strange. This response was about 171.2 mc. The only calculations which could produce this figure was the fourth harmonic of the 1st oscillator (3rd used in normal operation) beating with the signal to produce a second i.f. frequency of 455 kc. This is somewhat unusual for such a signal to get into the 455 kc i.f., but it did. However, the response was still within the limits set by Drake, so this is not a fault of the receiver. Unless there is a high-powered

Drake Marker Luxury

GENERAL SPECIFICATIONS

Size: 7⅞" × 2¾" × 10¼". 8¼ lbs.

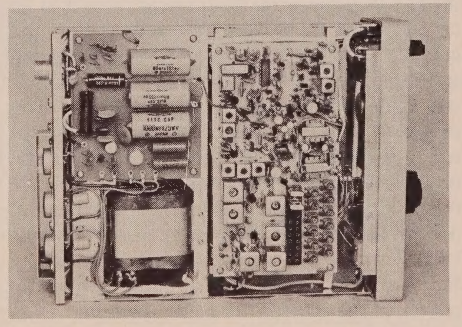
Power Requirements: 120 v.a.c. 6 watts receive, 50 watts trans. or 13.5 v.d.c. 0.5a. receive, 4a. transmit.

Accessories Furnished: Microphone, d.c. Cable, a.c. Cable, mobile antenna & cable, mounting kit, external speaker plug.

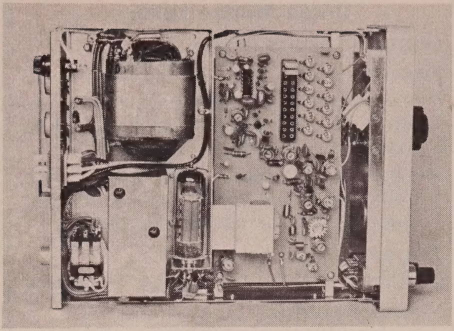
TECHNICAL SPECIFICATIONS

Receiver:	*Claimed*	*Achieved*
Sensitivity (20 db method)	0.5 μv	0.2 μv
Adjacent Channel Rejection		
30 kc	none	60 db
60 kc	none	63 db
Audio Recovery (full quieting signal)		
±5 kc dev.	0.5 w	0.6 w.
±7.5 kc dev.	none	0.65 w.
±15 kc dev.	none	0.65 w.
Number of Channels	12	12
Frequency Stability	0.001%	0.001%
Transmitter:		
Power output:		
a.c. Supply	10 w. min.	15 w.
d.c. Supply (13.5 v.)	10 w. min.	12 w.
Deviation:		
Preset	±5 kc	±13 kc
Maximum	±15 kc	†
Number of Channels	12	12
Frequency Stability	0.001%	0.001%

†Unmeasureable due to faulty deviation control as described above.



Viewed from below, the Drake Marker Luxury shows the "plain-Jane" layout of the completely solid state receiver section. The test unit showed 0.2 μv sensitivity for 20 db quieting.



Top view of the Drake Marker Luxury transceiver showing the hybrid transmitter circuitry. Note the 6360 tube at lower center. The troublesome deviation control is located to the left of the crystals and just above the 14-pin flat-pack IC.

government f.m. repeater near, there is very little chance of interference at this spurious response. All other spurious responses were 80 db or more down. The receiver accepted modulation up to ±15 kc wideband deviation. However, the distortion increased above 10 kc deviation sufficiently to become noticeable to the ear when using sine wave input. When using voice modulation, the distortion was considerably less noticeable because of the complex waveform of voice.

When checking out the transmitter one major fault was immediately found. The deviation of the transmitter was set at 13 kc and could not be decreased. The Ft. Worth Repeater is setup to equalize any deviation in excess of approximately 6 kc down to 6 kc. Thus, the excessive deviation of the test unit was not readily noticeable to others using the channel. The problem appeared to be caused by an open from the low side of the carbon path on the potentiometer to the grounded side of the control. This deviation potentiometer is the usual inexpensive subminiature type, and such a problem is not too uncommon with this type of control. The fix is simple. Two other units in the area have not had this problem. Because of the bad potentiometer, the maximum deviation possible with the test unit was beyond the 25 kc limits of the author's test equipment. The power of the transmitter using the built in a.c. supply was an exceptional 15 watts. When using the d.c. supply it dropped to 11.5 watts at the rated 13.5 v.d.c. and increased to 12.0 watts at the usual 13.8 v.d.c.

Construction

The construction of the Drake Marker Luxury 2 meter f.m. transceiver is very good. The circuit boards are constructed of good quality material (not glass eoxy, but what appears to be "poly clad" material). Workmanship is also of high quality. Most resin has been cleaned from the circuit boards, and the hand wired sections have strain relief where needed. Layout is "plain Jane" without any frills. With the exception of the small potentiometers the components appear to be very good quality. The case against the small adjustment potentiometers was borne out by the trouble with the deviation adjustment.

General Comments

The general comments about the Drake Marker Luxury 2 meter f.m. transceiver fall into the usual good features and bad features. In general, the good out-weighs the bad. However, it is up to the individual amateur to decide what features he likes best. Thus, the barbs and bouquets.

Our first criticism is the use of the small adjustment potentiometer. These controls are used extensively in the industry, but are somewhat prone to failure, especially when the control must be re-set several times.

No rubber feet or other mounting is provided for use on a table top. The case is perforated on both top and bottom for good ventilation, but the bottom holes do no good when the unit is lying flat on a desk or table. Also, there is the likelihood of the unit scratching the surface of the desk.

The channel markers on the selector switch are backlighted, but are somewhat difficult to read in direct sunlight or bright interior lighting. The numbers on the dial are clear, with a black background. Since the entire front panel is black, there is no contrast. It might be better to use a white background with red or similar coloring for the channel numbers.

Finally, the instruction manual is the bare essential for operating. The only service information is a large schematic with no voltage or resistance data. This data, along with circuit board layout diagrams would be of great help to the amateur who still does his own repair work.

In favor of the Marker Luxury is the fact that it will operate from both a.c. and d.c. sources, thus eliminating the need for a sepa-

[*Continued on page 100*]

DX

BY JOHN A. ATTAWAY,* K4IIF

THE top story for May is the very successful launching of the new *CQ* DX Awards which have been mentioned in past issues of the magazine. Countless time has been spent organizing for the new venture and having forms and certificates designed. However, the effort has been worthwhile as evidenced by applications from 74 enthusiastic DXers representing all continents, and this is just the first month.

Some DXers don't like to bother with separate c.w. and s.s.b. totals, prefix totals, or band countries, but there are many who enjoy this aspect just as much as big pileups and building big antennas. We would like to thank all the new award winners for their enthusiastic comments about the new program, and only wish there was sufficient time to respond to all the nice letters received. The opinions and support of old time DXers like W4OPM, K1SHN, W3DJZ, W6NJU, WA2RAU, DL9OH, and HP1JC, as wall as K1DRN, W9GHO, and K2QBW are greatly appreciated.

The new certificates are truly magnificent. The *CQ* Zone map is used as a background making them very similar to WAZ. It is in green for the 2X s.s.b. certificate and buff for the c.w. certificate, both with red lettering "*CQ* DX Award." Endorsement stickers were not immediately available, but may be obtained soon by sending an s.a.s.e. to Award Manager, Jerry Hagen, WA6GLD, P.O. Box 1271, Covina, California 91722.

Special thanks are in order to Jerry who spent time and effort far beyond the call of duty, to Bud Baldwin, W6CS, who printed the multitude of forms necessary for award administration, and to *CQ* Artist Bill Travis, who came up with the outstanding certificate design in a minimum of time. The job done by the *CQ* DX Advisory Committee and our overseas checkpoints in verifying cards is also gratefully acknowledged.

The CQ DX Award Honor Roll

The *CQ* DX Award Honor Roll recognizes those DXers who have submitted proof of confirmed contact with 275 or more countries using the mode indicated. The ARRL DXCC Country list, *less deleted countries,* is used as the country standard.

SSB DX

TI2HP	320	W4IC	309
W2TP	320	W9JT	307
DL9OH	318	I1KDB	305
WA2RAU	318	F2MO	302
WA2IZS	317	VE2WY	302
W9ILW	317	F9MS	300
K6LGF	316	K1SHN	298
K6YRA	315	HP1JC	285
I1AMU	313	WA0KDI	282
W3DZJ	313	K4RTA	279
W6EUF	310	G3RWQ	276
W6NJU	310		

C.W. DX

W6ID	319	K1SHN	286
W4OPM	300	W6ISQ	285
WA6EPQ	294	W4BQY	281
W6NJU	290		

In future issues the *CQ* DX Award Honor Roll and the WPX Honor Roll will be published in alternate months.

Turning now to the top scoring stations, it was no surprise to see W2TP and TI2HP on top of the new S.S.B. Honor Roll as they were always prime contenders on the old list. How-

The VP2EE gang on Anguilla after their successful DXpedition during the CQ Worldwide Phone Contest in October. Left to right are Jose Cijntje, PJ7JC; Jim Walsh, K9RHN/0; Wayne Warden, W9IGW; Dave Zeph, W9ZRX/VP2EE; and Les Bannon, W9ZTD. 3537 QSO's were made during the contest as multi-op, single-transmitter. QSL to W9ZRX. *(Photo via W9ZRX.)*

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*P.O. Box 205, Winter Haven, Fl. 33880

KURE WILDLIFE REFUGE
PLEASE DO NOT DISTURB
SEALS, TURTLES OR
SEABIRDS
W7UXP
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME

This series of pictures were taken during the famous W7UXP/Kure DXpedition, CQ World Wide Phone Contest, October, 1971. Left to right are Gary, KH6HCM/W7UXP; Gary, Harley, and the island; and Harley, KH6HGP. In their 5-day stay on Kure the boys made 4700 QSO's in 134 countries and 37 zones. A short layover on Midway contributed an additional 1100 contacts as W7UXP/KM6. All QSL's go to KH6HCM. They plan to return again for the 1971 CQ contest.
Since returning to Hawaii Gary has been active on 160. In December he worked PJ2CC and VP2VL. Both are believed to be firsts on top band. *(Photos via KH6HCM.)*

ever, on c.w. it was a different story. Several "Big Guns" were dismayed at their low totals on c.w., and W6ID landed on top without much difficulty. Vip's secret is the lack of s.s.b. transmitter, plus 40 years of DXing.

It should be noted that these are *both* new awards, and previous s.s.b. scores are not relevant. Members of the old Honor Roll should contact WA6GLD if interested in re-

The WPX Program

S.S.B. WPX

578......WA3NRV
579......WA2EAH
580......WB4KZG
581......UA3HB
582......UA0DG
583......JH1HWN
584......PA0UC
585......UC2BF
586......WB6DXU
587......EL2BZ
588......CR6MN
589......ON4XG

C.W. WPX

1076......K2IEF
1077......UB5KBG
1078......UC2OC
1079......UA3KQH
1080......UB5NM
1081......W8TJQ
1082......LZ1KSA
1083......CE2PN
1084......K7ABV
1085......DL1IV
1086......ON4XG

Mixed WPX

267......F2QQ
268......UC2BF

Phone WPX

204......WB2RLK
205......YV1TP

WPNX

27......WN6KMV

VPX

33 (Mixed)......WPE4JPC

WPX Endorsements

S.S.B.: G3DO–700, W0GYM–550, CT1LN–550, I1LCK–550, CR4BC–450, WB6DXU–400, K6SSN–350, UA3FT–350, DL5GJ–300, WA3NRV–250, UA0DG–250, K5-VYT/4–250, and W8MXO–250.

C.W.: UA3FT–550, UD6BW–500, UB5LS–450, W2MBU–450, W0HAO–400, K6-TZX–400, and UB5WL–350.

Mixed: G3DO–800, W3GJY–750, CT1LN–700, WA0CPX–600, VE3UR–600, W4-WSF–600, W0BE–550, K9YXA–450, and W2MB–450.

Phone: PA0SNG–800, G3DO–750, CT1LN–650, and WB2RLK–500.

80 Meters: UB5LS.

40 Meters: PA0SNG.

20 Meters: K0DEQ, I1BJG, and UB5LS.

10 Meters: WA3NRV and I1BGJ.

Asia: YU1SF and I1BGJ.

Europe: W8PQD, W4WSF, I1BGJ, K1LWI, and UB5LS.

North America: K0DEQ, PA0SNG, and WA6HRS.

Oceania: K1LWI and WB2FMK.

South America: W2HO, W8PQD, and PA0-SNG.

Complete rules for WPX, WPNX, and VPX may be found on pgs. 66-67 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, Ca. 91722, or to the DX Editor.

The CQ DX Award Program

C.W. DX Awards

1......W6NJU
2......W0YVA/4
3......DL3RK
4......W4OPM
5......W6ID
6......W6CS
7......K2QBW
8......K6AUC
9......W6WX
10......W7VSE
11......W4WSF
12......K6BAG
13......W6RGG
14......K1BOM
15......W6GBY
16......WA6EPQ
17......K6OZL/KP4
18......K1SHN
19......W4BQY
20......WA4EPM
21......K4OCE
22......W2MBU
23......WA4HHW
24......WB2NDI
25......W6ISQ

S.S.B. DX Awards

1......K6YRA
2......TI2HP
3......W0YDB
4......F9MS
5......K1DRN
6......W6EIF
7......VR1L
8......DL9OH
9......W4IC
10......WA2RAU
11......W9GHO
12......K6MMP
13......W8IHD
14......K6LGF
15......W2TP
16......W3DJZ
17......W0YVA/4
18......W6CS
19......W9FD
20......K6SSN
21......K6BAG
22......W4WSF
23......W6KDI
24......K0WWX
25......G3RWQ
26......KC6WS
27......F2MO
28......W6NJU
29......WB2YPN
30......WB6DXU
31......W2FLA
32......K4KZZ
33......K5VYT/4
34......VK7DK
35......WA6EPQ
36......CR6MN
37......WA0KDI
38......W9ILW
39......K3TVE
40......W0SFU
41......K6OZL
42......I1AMU
43......WA1LDA
44......W6EUF
45......HP1JC
46......W4BQY
47......WA2IZS
48......K0VVW
49......W6FXB

Complete rules for the *CQ* DX Award program may be found on p. 58 of the January issue. Application blanks and copies of the rules may be obtained by sending a self-addressed, stamped envelope to the Award Manager, P.O. Box 1271, Covina, Ca. 91722, or to the DX Editor.

applying, and holders of the pre-1971 *CQ* S.S.B. DX Award may also apply for the new certificate. Our Award Manager has found this to be a rewarding project, and we all hope that the program will grow to major status such as that of WPX and WAZ.

De Extra

This outstanding 160 m. DX station OK1ATP/Jardey is in the forefront of DX working from Europe. 1.8-21 mc, 10-80 watts. Rig all home made including 15 tube receiver and 3 tube converter! *(Photo bia W1BB.)*

"Government-in-the-Sunshine"—Would It Revitalize ARRL?—About two years ago the State of Florida put it's "Government-in-the-Sunshine" law into effect, and despite predictions of chaos, it has worked. The purpose of this law is to eliminate closed meetings of public bodies. It makes it illegal for any governmental board, commission, or similar group to close their doors to the citizenry for any of their meetings. In its strictest interpretation, this law forbids undisclosed meetings of board or commission members on even a casual basis if discussions are to be held on topics which will later be subject to vote at official meetings.

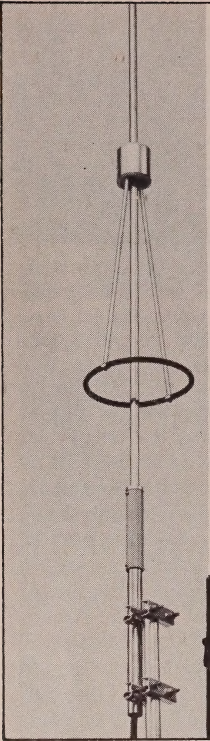
There are many who feel that the American Radio Relay League is run by a small clique who determine policy without regard for the wishes of the membership. However, it must be said that it is difficult to find people sufficiently enthusiastic to accept work and responsibility year in and year out in any organization. Whichever view you hold, wouldn't it dispell much of the doubt and criticism if League board meetings were opened to the membership?

Some may fear chaos, but we don't feel such fears are justified. We have seen state boards and commissions meet here in Florida to debate issues with great emotion, political impact. These meetings are frequently conducted in auditoriums packed with people, yet serious difficulties have not arisen. So it could be with ARRL. Open the door and let the sunshine in. It could initiate a new era of growth.

New DX Committeeman

We are pleased to announce that the Poto-

G3TXH during a recent visit to the shack of W4-NJF. *(Photo via W4NJF.)*



NEW CONCEPT...
in 2 METER FM OMNI

Again. Out of research comes increased performance. Avanti's unique ARD-257 2-meter FM omni is engineered to give you more gain and all around higher performance than any other antenna of its type or price. The patented tapered skirt configuration produces 4.17 db gain (measured over ¼ wave ground plane) plus a low angle of radiation that has proved effective in eliminating dead spots. No coils or transformers to detune or burn out . . . unaffected by temperature and humidity. The small projected area and light weight provides easy mounting and gives wind survival to 120 MPH.

Construction is all aircraft quality aluminum and fiberglass. Antenna comes complete with coax lead, mounting hardware and fiberglass mast current eliminator.

Other frequencies from 140-175 MHz are available upon specification.

SPECIFICATIONS:

Gain—4.17 db
V.S.W.R.—1.5:1 or less
Bandwidth—±3.5 MHz
Impedance—50-52 ohms
Power Handling—1000 watts
Polarization—Vertical
Connector—PL-259

$44.95

avanti
33-35 WEST FULLERTON AVENUE,
ADDISON, ILLINOIS 60101
AVANTI RESEARCH & DEVELOPMENT, INC.
We also have a complete line of high performance mobile antennas.

mac Valley Radio Club is now represented on the *CQ* DX Awards Advisory Committee by John C. Kanode, W4WSF. John can verify cards for WAZ and the *CQ* DX Awards for DXers in the Potomac Valley club area, one of the largest DX and contest operating centers in the entire world. He attends 95% of PVRC meetings, or may be reached at 244 Parkway St., Winchester, Va. 22601, phone (703) 662-5803, or at 214 Brookes Ave., Apt. 202, Gaithersburg, Md. 20760, phone (301) 869-1646. Welcome to the Committee John.

QRPp—It Puts the Amateur Back into Amateur Radio

For several months this column has enthusiastically endorsed the sport of very low power (QRPp) DXing. At the beginning we were attracted solely by the challenge it offered. Even routine DX into Europe or the Pacific can provide a real test of ability when you are only running 1 or 2 watts.

However, we now view the movement as important for reasons far more compelling than the enjoyment it brings. QRPp puts the amateur back into amateur radio.

The past decade was the era of the commercially produced s.s.b. transceiver, and the

The WAZ Program

S.S.B. WAZ

841......W1TOU
842......W5OVU
843......JH1HWN
844......DJ4PI
845......F2VX
846......YV1PP
847......K0VVW
848......UY5XS
849......UD6BR
850......UA3FF

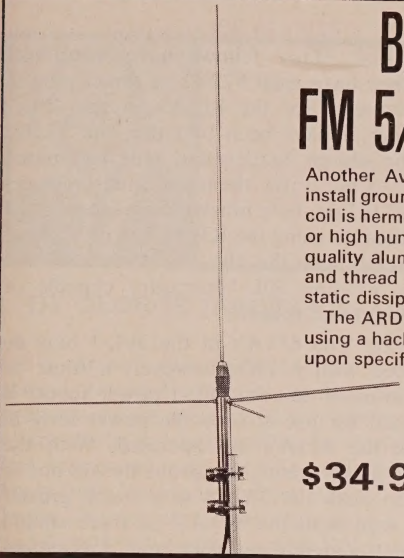
C.W.—Phone WAZ

3084......W1DIT
3085......DJ6NI
3086......W0YOY
3087......WA3GTX
3088......HI8XAL
3089......W4MGL
3090......WA2HIU
3091......K6AUC
3092......G3JBR
3093......DL8OE
3094......DL7BI
3095......DK1YK
3096......DL1EC
3097......OE6GC
3098......OK2KOS
3099......OK1AGI
3100......OK1AOR
3101......JH1VOE
3102......SP5BAK
3103......DK3FD
3104......DL3VI
3105......DL7LV
3106......DL7NB
3107......UB5LS
3108......UG6AW
3109......UA3FL
3110......UA3KTV
3111......UL7JG
3112......YU3DQ

Phone WAZ

452......W9HJ

Complete WAZ rules are shown on pgs. 64-66 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to DX Editor, P.O. Box 205, Winter Haven, Florida 33880.



BASE LOADED 2-METER FM 5/8 WAVE GROUND PLANE

Another Avanti 1st. The ARD-250 is a high performance easy to install ground plane that will give years of reliable service. Our loading coil is hermetically sealed in Cycolac to prevent detuning in corrosive or high humidity atmospheres. The rest of the antenna is all aircraft quality aluminum. The radiator and radials are 5/16" solid aluminum and thread securely into the coil. Direct ground construction allows static dissipation for low noise ratios.

The ARD-250 is factory tuned but may be field trimmed by simply using a hacksaw. Other frequencies from 140-175 MHz are available upon specification.

$34.95

SPECIFICATIONS:

Frequency—140-175 MHz
Gain—3db
V.S.W.R.—1.5:1 or less
Bandwidth—±3.5 MHz
Impedance—50-52 ohms
Power Handling—250 watts intermittent
150 watts continuous
Polarization—Vertical
Connector—PL-259

avanti

33-35 WEST FULLERTON AVENUE,
ADDISON, ILLINOIS 60101

AVANTI RESEARCH & DEVELOPMENT, INC.

We also have a complete line of high performance mobile antennas.

art of homebrew became too complex and expensive for most amateurs. Now a change is in progress. Thanks to Ten-Tec modules, International Crystal kits, and books like Volume I of the *Milliwatt,* offered by Ade Weiss, K8EEG/0, Meckling, S.D. 57044; and *Solid State QRP Projects* written by W3FQJ and published by Howard W. Sams & Co., Indianapolis, Ind. 46268, all amateurs are again eligible for the home brew fun which is rapidly becoming the "in" thing.

These tiny QRPp rigs are solid state of course, and a beautiful side effect of this movement is that many are learning, and putting to use, knowledge of practical solid state technology for the first time. Cost need no longer keep anyone from amateur radio. The bright eyed young man in the basement workshop is with us again. Vive la QRP.

New Prefixes

DA, DB, DF—The following prefixes are being issued to *new* licensees in Germany: DA1AA-DA2ZZ—Foreign military personnel eligible for full amateur privileges.

DA4AA-DA4ZZ—Foreign military personnel elegible for v.h.f./u.h.f. licenses.

DB1AA-DB9ZZ—German nationals with full privileges.

DF1AA-DF9ZZ—German nationals with v.h.f./u.h.f. privileges.

DB0 and DF0—Special calls.

OB—OB1-OB8 prefixes are being used for special events in Peru.

PZ—New prefixes are being issued by areas in Surinam as follows: PZ1—Paramoribo, PZ2—Nickerie, PZ3—Coronie, PZ4—Saramacca, PZ5—foreign visitors, PZ6—Para, PZ7—Brokopondo, PZ8—Commewijne, PZ9—Marowijne, and PZ0—Special stations.

SZ—A special Greek prefix being used to celebrate the 150th anniversary of the liberation of Greece.

QSL Manager of the Month

The latest winner of the Scott's QSL Service golden trophy is the *CQ* DX Department's Hawaiian representative, Ed DeYoung, KH6GLU, who handles confirmations for VR3C, VR3DY, ZK1AJ, ZK1MA, and FW8DY.

Ed was first licensed in 1955 as KN5COU in Corpus Christi, Texas. He became a DXer in 1965 as K6CAA and managed several

[*Continued on page 102*]

Q AND A

BY WILFRED M. SCHERER,*
W2AEF

NC-300 Problem

QUESTION: I recently picked up a National NC-300 Receiver. Is there a direct tube substitution that will replace the original r.f. and mixer tubes to lower the noise level? I am using a 417-A 2-meter converter (28 mc i.f.) and notice the converter adds no noise to this receiver as it did to other ones I've had. Can you suggest improvements to this receiver from past articles?

ANSWER: Installation of different tubes (particularly hotter ones) in the front end of a receiver often ends up with instability and oscillation with a deterioration in the signal-to-noise ratio. You might, however, try a 6GM6 or 6DC6 in the r.f. stage, but before doing this, we suggest a complete realignment job on the set, especially since we suspect it is a second-hand job that may well need servicing. Also, make sure the converter is properly matched to the receiver input, check receiver tubes, voltages, etc.

CQ
Oct. 1964, p. 79 —S-meter Sensitivity.
Oct. 1966, p. 92 —NC-300 Intermittents.
Feb. 1960, p. 70 —NC-300 Vernier Dial.
Feb. 1959, p. 39 —Modifying NC-300 for WWV.
May 1959, p. 41 —NC-300 Revisions.

73 Magazine:
Sept. 1969, p. 52 —Improving NC-300 SSB Reception.
May 1966, p. 114 —Permanent Cure for the NC-300 Filament Regulation.
April 1966, p. 94 —SSB and the National NC-300.

Some of the above information is given in NC-300 Service Bulletins which might still be obtainable from National Radio.

572B's In 30L-1 Linear

QUESTION: Many fellows have mentioned that they have used 572B's as direct plug-in replacements for the 811A's in the 30L-1 amplifier. I have been told that the 572B's can be driven harder and will last much longer. Can I use them as direct replacements? If I do, how much plate current can I load them to using the KWM-2 as an exciter? I currently load the 30L-1 to about 700 ma. Is the existing 30L-1 circuitry capable of handling these tubes?

ANSWER: The 811A's in the 30L-1 may be replaced with 527B's; however, it must be kept in mind that the 30L-1 power supply is designed for use at only the power level at which the 811A's are operated. With the KWM-2 as a driver, you probably will not be able to push the 527B's to a much greater level than with the 811A's, so there should not be too great a problem here. Any potential power increase within the above limitations will not produce a significantly greater signal, making the additional cost unjustifiable. The only advantage might be that these tubes will probably run cooler than do the 811A's. Also note that the impedance relations of the existing circuitry and the potential difference in r.f. feedback may deteriorate the distortion products when the 572B's are used. Note also that the tank circuitry and the filament choke are designed for operation at the power levels for which the 30L-1 is designed; however, with the duty cycle imposed by s.s.b., the components should hold up okay where you might be running *slightly* more power.

With proper tuneup and operation of the amplifier, there is no reason why the 811A's should not last as long as the other tubes, so all in all, to obtain quality performance with safety we suggest you stick to the original tubes.

Transceive With 75A-4

QUESTION: Have you any information on a conversion for the 75A-4 receiver to provide transceive type operation? I understand this can be done.

ANSWER: We have no data on a conversion for transceive operation with the 75A-4. In some cases it probably could be worked out, but this will depend on the conversion scheme used in the associated transmitter. Since the question did not mention the type

[*Continued on page 100*]

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*Technical Director, *CQ*.

Propagation

BY GEORGE JACOBS,* W3ASK

As the sun rises higher in the northern skies, optimum frequencies for long-distance propagation are somewhat *lower* during most of the daylight hours, and *higher* during the late afternoon, early evening and nighttime hours, than during the winter months. Static levels also increase noticeably during May and signal levels during daytime DX openings may be somewhat weaker than during previous months.

The following is an overall picture of h.f. amateur band openings forecast for May, 1971. For specific times of DX openings, refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts valid for May and June, as well as Charts centered on Hawaii and Alaska. The Short-Skip Charts contain propagation forecasts for circuits varying in length between distances of 50 and 2300 miles. For day-to-day propagation conditions expected during the month, see the "Last Minute Forecast", which appears at the beginning of this column.

10 Meters: seasonal decrease is expected in DX conditions on this band during May. While fewer DX openings are forecast, some fairly good ones still should be possible to some tropical and southern areas during the daylight hours. Frequent short-skip openings, between distances of approximately 750 and 1400 miles, are forecast for May.

15 Meters: This is expected to be the best band for DX propagation conditions during much of the late morning and early afternoon hours. Excellent DX openings are forecast to many areas of the world from shortly after sunrise, through the early evening hours, and into the hours of darkness on some circuits. Numerous short-skip openings, between approximately 600 and 2300 miles are also predicted for May.

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for
May, 1971

Days	*Rating & Forecast Quality*			
	(2)	(1)	(4)	(3)
Above Normal: 3, 5, 10, 22, 24, 30.	B	B-C	A	A-B
Normal: 1-2, 4, 6, 9, 11-14, 18-19, 21, 23, 25, 26-29, 31.	C	D	A-B	B
Below Normal: 7-8, 15-17, 20, 26.	D	E	B-C	C-D
Disturbed: None	E	E	C-D	D-E

HOW TO USE THESE CHARTS

The following is an explanation of the symbols shown above, and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 2 and 13 days; (1) less than 7 days.

On the "Short-Skip" Chart where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. Note the forecast rating for later use.

3—With the forecast rating noted above, start with the numbers in parenthesis at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating high than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meaning: (A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak and considerable fading and noise; E—poor opening, or none at all.

4—This month's Propagation Charts are based upon a transmitter power of 75 watts c.w.; 150 watts s.s.b., or 800 watts d.s.b., into a dipole antenna one quarter-wave above ground on 160, 80 and 40 meters and a half-wave above ground on 20, 15 and 10 meters. For each 10 db increase above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss reception will become poorer by one level.

5—Local standard Time for these predictions is based on the 24-hour system.

6—These Propagation Charts are valid through June 15, 1971. These Charts are prepared from basic propagation, data published monthly by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado.

20 Meters: The band should be open for DX to one area of the world or another practically around-the-clock. It should be the optimum band for DX openings during the early evening hours, the hours of darkness and the sunrise period. Exceptionally high signal levels are likely to occur on DX openings during the hours of darkness, twilight and dawn. Numerous short-skip openings should also be possible on this band between distances of approximately 350 and 2300 miles. Quite often, especially during the late afternoon hours, optimum conditions will exist for openings as short as a few hundred miles and as long as several thousand miles. This is expected to result in an exceptionally high level of interference as long and short-skip stations will be heard at the same time.

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*11307 Clara Street, Silver Spring, Md. 20902

40 Meters: With fewer hours of darkness and higher static levels, 40 meter DX propagation conditions are expected to decline somewhat during May. Some fairly good openings, however, are predicted to many areas of the world during the hours of darkness and the sunset and sunrise periods. Excellent daytime short-skip openings are forecast for distances between approximately 150 and 750 miles, with nighttime openings extending up to the short-skip limit of approximately 2300 miles. .

80 Meters: High static levels and fewer hours of darkness are expected to reduce DX openings on this band during the month, but a few fairly good openings still should be possible to some areas of the world during the hours of darkness. Excellent short-skip openings are forecast during the daylight hours over distances ranging between approximately 50 and 250 miles. During the hours of darkness, the short-skip range should increase up to approximately 2300 miles.

160 Meters: There is little chance for more than a very occasional DX opening on this band during May. What few openings may occur should take place during the hours of darkness and the sunrise period. Short-skip openings beyond the groundwave range of approximately 50 miles are also unlikely during the daylight hours. As the sun sets, however, short-skip openings should be possible up to a distance of approximately 1000 miles. Occasional openings beyond this range may be possible on some nights when static levels are low.

V.H.F. Ionospheric Openings

A considerable seasonal increase in sporadic-E ionization should take place during May. This is expected to result in some fairly good 6 meter short-skip openings between distances of approximately 1000 and 1400 miles. During periods of widespread sporadic-E ionization, two-hop openings up to a distance of approximately 2600 miles may also be possible. Sporadic-E openings on 6 meters are most likely to occur between 9 A.M. and 1 P.M., and between 5 P.M. and 9 P.M. local standard time. An occasional 2 meter short-skip opening, between approximately 1200 to 1400 miles, may also be possible during periods of intense sporadic-E ionization. Refer to "V.h.f. Ionospheric Propagation", which appeared in the November, 1969 issue of *CQ* (page 37), for a do-it-yourself method for predicting v.h.f. sporadic-E short-skip openings.

The possibilities during May should be good for some 6 meter trans-equatorial (TE) scatter openings. TE openings are most likely to occur between 8 and 11 P.M., local standard time at the path mid-point, on long north-south paths which cross the geomagnetic equator at approximately a right angle. TE openings favor locations in the southern area of the USA, but an occasional opening should be possible into the central and northern areas as well.

Some fairly good meteor-scatter openings of short duration should be possible on the v.h.f. bands during the *Eta Aquarids* meteor shower which is expected to occur May 4-6. This is a major meteor shower, and it should reach maximum intensity around 2100 GMT on May 5, with an expected 0 hourly meteor count in excess of 20.

While auroral activity is generally at a low level during May, some displays may occur during periods of below normal or disturbed h.f. conditions. During such periods, openings are likely to occur on 6 and 2 meters for distances up to approximately 1200 miles, as a result of reflection or scatter from ionized patches produced by the auroral displays. Check the "Last Minute Forecast" at the beginning of this column for periods during May that are expected to be below normal or disturbed.

Sunspot Cycle

The Federal Solar Observatory at Zurich, Switzerland reports a sunspot number of 78 for January, 1971. This results in a 12-month smoothed sunspot number of 103, centered on July, 1970, as the present sunspot cycle continues to slowly decline. This month's propagation predictions are based upon a predicted smoothed sunspot number of 82, centered on May, 1971. ■

BE SURE TO READ

PAGES 52 AND 56

CQ Short-Skip Propagation Chart

May and June, 1971
Local Standard Time At Path Midpoint
(24-Hour Time System)

Distance From Transmitter (Miles)

Band (Meters)	*50-250 Miles*	*250-750 Miles*	*750-1300 Miles*	*1300-2300 Miles*
10	*Nil*	07-09 (0-1) 09-13 (0-2) 13-17 (0-1) 17-21 (0-2) 21-23 (0-1)	07-09 (1-2) 09-13 (2-3) 13-17 (1-2) 17-21 (2) 12-07 (1)	07-09 (2-0) 09-13 (3-0) 13-17 (2-0) 17-21 (2-1) 21-07 (1-0)
15	*Nil*	06-09 (0-2) 09-13 (0-3) 13-17 (0-2) 17-19 (0-3) 19-23 (0-2) 23-06 (0-1)	06-09 (2) 09-13 (3) 13-17 (2-4) 17-19 (3-4) 19-21 (2-3) 21-23 (2) 23-06 (1)	06-09 (2-1) 09-13 (3-2) 13-15 (4-3) 15-19 (4) 19-21 (3-2) 21-23 (2) 23-06 (1-0)
20	09-12 (0-1) 12-18 (0-2) 18-00 (0-1)	06-09 (0-2) 09-12 (1-3) 12-18 (2-4) 18-20 (1-3) 20-00 (1-2) 00-06 (0-1)	06-09 (2-3) 09-12 (3-4) 12-18 (4) 18-20 (3-4) 20-22 (2-4) 22-00 (2-3) 00-06 (1-2)	06-09 (3) 09-15 (4-3) 15-22 (4) 22-00 (3-4) 00-02 (2-3) 02-06 (2)
40	06-08 (1-2) 08-11 (2-4) 11-19 (3-4) 19-21 (2-3) 21-00 (1-2) 00-06 (0-1)	06-08 (2-4) 08-09 (4-3) 09-15 (4-2) 15-17 (4-3) 17-19 (4) 19-21 (3-4) 21-00 (2-3) 00-06 (1-3)	07-09 (4-3) 09-15 (2-1) 15-17 (3-1) 17-19 (4-2) 19-21 (4) 21-02 (3-4) 02-07 (3)	07-09 (3-1) 09-17 (1-0) 17-19 (2-1) 19-21 (4-3) 21-02 (4) 02-05 (3-4) 05-07 (3)
80	07-10 (4) 10-18 (4-3) 18-22 (4) 22-07 (3-4)	07-10 (4-1) 10-16 (3-0) 16-18 (3-1) 18-20 (4-2) 20-05 (4) 05-07 (4-3)	07-08 (1) 08-10 (1-0) 10-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-3) 22-05 (4) 05-07 (3-2)	07-08 (1-0) 08-18 (0) 18-20 (1-0) 20-22 (3-2) 22-03 (4-3) 03-05 (4-2) 05-07 (2-1)
160	05-08 (4-1) 08-09 (3-0) 09-18 (2-0) 18-20 (3-1) 20-22 (4-2) 22-05 (4-3)	05-08 (1) 08-18 (0) 18-20 (1-0) 20-22 (2-1) 22-00 (3-2) 00-03 (3) 03-05 (3-2)	07-08 (1-0) 08-20 (0) 20-22 (1) 22-00 (2-1) 00-03 (3-2) 03-05 (2) 05-07 (1)	07-20 (0) 20-00 (1) 00-03 (2) 03-05 (2-1) 05-06 (1) 06-07 (1-0)

ALASKA

Openings Given In GMT†

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	*Nil*	19-20 (1) 20-22 (2) 22-00 (1) 00-02 (2) 02-03 (1)	20-22 (1) 22-02 (2) 02-06 (3) 06-08 (2) 08-10 (1) 10-14 (2) 14-16 (1)	07-11 (1)
Central USA	*Nil*	18-21 (1) 21-23 (2) 23-01 (1) 01-04 (2) 04-05 (1)	02-08 (3) 08-14 (2) 14-22 (1) 22-02 (2)	07-12 (1)
Western USA	*Nil*	18-20 (1) 20-23 (2) 23-02 (1) 02-05 (2) 05-06 (1)	02-04 (3) 04-08 (4) 08-14 (3) 14-18 (4) 18-20 (3) 20-02 (2)	07-09 (1) 09-14 (2) 14-16 (1) 12-15 (1)*

HAWAII

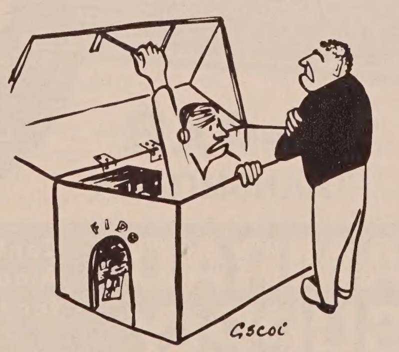
Openings Given In
Hawaiian Standard Time‡

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	15-17 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-15 (1) 15-18 (2) 18-20 (3) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-07 (2)	19-20 (1) 20-23 (3) 23-02 (1) 20-21 (1)* 21-23 (2)* 23-01 (1)*
Central USA	14-15 (1) 15-17 (2) 17-18 (1)	07-09 (1) 09-12 (2) 12-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	08-12 (1) 12-16 (2) 16-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-06 (3) 06-08 (2)	19-20 (1) 20-21 (2) 21-01 (4) 01-02 (2) 02-04 (1) 20-21 (1)* 21-00 (2)* 00-03 (1)*
Western USA	11-13 (1) 13-17 (2) 17-19 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-19 (3) 19-21 (2) 21-23 (1)	06-08 (4) 08-16 (3) 16-21 (4) 21-01 (3) 01-06 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-07 (1) 19-20 (1)* 20-21 (2)* 21-03 (3)* 03-04 (2)* 04-05 (1)*

†To convert to Local Standard Time in Alaska, *subtract* 8 hours from the GMT times shown in the Chart if you live in the Pacific Standard Time Zone; 9 hours in the Yukon Zone; and 10 hours in the Alaskan Standard Time Zone. In other USA Time Zones, *subtract* 5 hours from GMT in the EST Zone; 6 hours in the CST Zone and 7 hours in the MST Zone. For example, at 20 GMT it is Noon in Juneau and 15 or 3 P.M. in N.Y.C.

‡To convert from HST shown in the Chart to Local Standard Time in other USA Time Zones, *add* 2 hours in the PST Zone; 3 hours in the MST Zone; 4 hours in the CST Zone; and 5 hours in the EST Zone. Add 10 hours to convert from HST to GMT. For example, when it is Noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT.

*Indicates predicted 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meters openings are shown with a forecast rating of (2) or higher.



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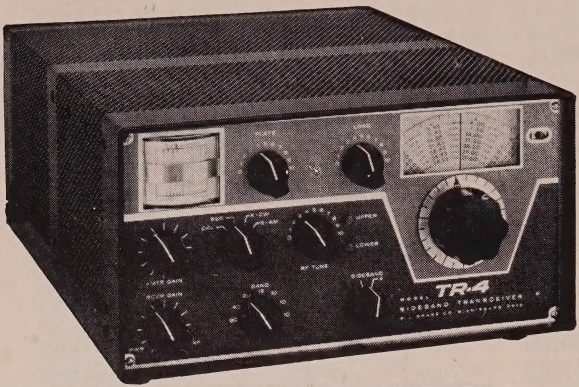

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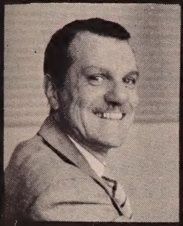

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Apr. 24-25	PACC DX Contest
Apr. 24-25	WAE RTTY Contest
Apr. 24-25	ONE Land QSO Party
May 1-2	OZ-CCA DX C.W. Contest
May 1-3	Georgia QSO Party
May 8-9	USSR C.W. DX Contest
May 15-16	Bermuda Phone Contest
May 15	World Telecomm. C.W.
May 22	World Telecomm. Phone
May 21-23	YL ISSBers QSO Party
June 4-7	CHC/FHC/HTH QSO Party
June 13-19	Mass. Amateur Radio Week
June 15-19	Mass. Cities & Towns Contest
June 20	WAB VHF Phone Contest
June 19-20	Bermuda C.W. Contest
July 3-4	Venezuela Contest
July 17-18	Colombia Contest
July 24-25	County Hunters C.W. Contest
Sept. 11-13	Delta QSO Party
Oct. 9-10	RSGB 28 mc Phone Contest
Oct. 23-24	RSGB 7 mc C.W. Contest
Oct. 30-31	**CQ WW DX Phone Contest**
Nov. 6-7	RSGB 7 mc Phone Contest
Nov. 27-28	**CQ WW DX C.W. Contest**

PACC DX Contest

Starts: 1200 GMT Saturday, April 24
Ends: 1800 GMT Sunday, April 25

Mailing deadling June 1st to: PACC Contest Manager, L.V.D. Nadort, PA0LOU, Bospolderstraat 15, Nieuwerkerk, A.D. Ysel, The Netherlands.

WAE RTTY Contest

Starts: 0000 GMT Saturday, April 24
Ends: 2400 GMT Sunday, April 25

Mailing deadline is June 10th to: WAEDC Contest Committee, D-8950 Kaufbeuren, P.O.B. 262, Germany.

One Land QSO Party

Starts: 0001 GMT Saturday, April 24
Ends: 2400 GMT Sunday, April 25

Mailing deadline is May 30th to: N.E. Chapter #32, Att: George Levensalor, W1DPJ, 399 Buck Street, Bangor, Maine.

Complete rules for the preceeding three events appeared in last month's CALENDAR.

OZ-CCA DX C.W. Contest

Starts: 1200 GMT Saturday, May 1
Ends: 2400 GMT Sunday, May 2

This is the 20th running of this world wide contest by the EDR of Denmark, Use all bands, 3.5 thru 28 mc in single operator and multi-operator classifications.

A rest period has been added this year, for single operators, only 30 hours can be used for contest operation. The 6 hours of rest must be shown on the log and taken in not more than 2 periods.

Exchange: Six figures, RST plus a progressive QSO number starting with 001.

Points: Contacts with stations on the same continent 2 points, other continents 3 points. OX, OY and OZ QSOs count double.

Multiplier: Is determined by the number of countries worked on each band. Call districts in the following countries will also be considered as multipliers: W/K, VE/VO, PY, LU, VK, ZL, JA, OZ, OY, OX.

Final Score: Total QSO points multiplied by the sum of the multiplier from all bands.

Awards: Certificates to top scorers in each country and call areas listed above.

Include a summary sheet and signed declaration with your log and mail it before June 15th to: E.D.R. Contest Committee, P.O. Box 335, 9100 Aalborg, Denmark.

Georgia QSO Party

Starts: 2000 GMT Saturday, May 1
Ends: 0200 GMT Monday, May 3

The Columbus ARC is again sponsoring this the tenth annual QSO party. The same station may be worked on each band and mode for QSO points. (Ga. to Ga. contacts permitted)

Exchange: QSO nr., RS/RST and QTH; county for Georgia; state, province for others.

Scoring: Each QSO counts 2 points. Georgia stations multiply total by number of different states and VE provinces worked. Out-of-state stations use Georgia countries for their multiplier. (max. of 159) DX may be worked for QSO points but does not count as multiplier.

Frequencies: c.w.–1810, 3590, 7060, 14060, 21060, 28060. s.s.b.–3975, 7260, 14290, 21410, 28600. Novice–3718, 7175, 21110. (Try 160 at 0300, 10 on the hour, 15 on the half hour.)

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*14 Sherwood Road, Stamford, Conn. 06905.

Awards: Certificates to the highest scoring station in each state, province, country and Georgia county. Also to the top scoring Ga. and non-Ga. novice. There are also Plaques for the leading Ga. station, out-of-state station, Georgia Club with highest aggregate score and top scoring Ga. mobile or portable outside his own county.

Make up your log in the usual sequence, include a summary sheet and a signed declaration and mail before June 7th to: Columbus ARC, Att: John T. Laney III, K4BAI, 1905 Iris Drive, Columbus, Georgia 31906. Include a large s.a.s.e. for copy of the results.

USSR DX C.W. Contest

Starts: 2100 GMT Saturday, May 8
Ends: 2100 GMT Sunday, May 9

The Radio Sports Federation of the USSR invites radio amateurs all over the world to take part in their "CQ–M" Contest, to strengthen friendly relations among the amateurs from all countries.

Remember, this is a world wide type contest, so do not confine your activity to working USSR stations only. Use all bands, 3.5 thru 28 mc.

Catagories: Single operator, both all band and single band. Multi-operator, single transmitter. And s.w.l.'s.

Exchange: RST plus the number of their oblast (region) for the USSR boys, RST plus a progressive QSO number starting with 001 for the rest of us.

Points: One point for QSO's between stations on the same continent, 3 points between stations on different continents. Contacts between stations in the same country have no value.

S.w.l.'s credit 1 point if one station of a contest QSO is reported, 3 points if both sides are reported.

Multiplier: Is derived from the countries and territories on the "R–150–S" list. (The listing seemed to be along the same lines as the ARRL DXCC list. However we did note the omission of BV and many of the uninhabited islands. The list of USSR countries was more elaborate with the Siberian countries sub-divided into regions.)

Final Score: Sum of QSO points multiplied by the sum of countries and regions in the R–150–S list. (This was not made clear but in previous contests the same country was counted only once as a multiplier.)

Awards: 1. To the top scorer in each catagory in each country.

2. 1st–3rd place in each continent.

3. World leading single operator and multi-operator stations. A separate award if the score is on 3.5 mc only.

Awards will be made in the forms of certificates, badges and trophies, depending on the classification. (Providing at least 5 entries are received from that country, or 10 from each continent.)

Contest contacts may be credited for the many USSR awards in lieu of QSL cards. (R–150–S, R–15–R, R–6–K, W–100–U, R–100–O, R–10–R)

Mailing deadline is June 1st to: Radio Sports Federation, P.O. Box 88, Moscow, USSR.

Bermuda Contest

Phone: May 15-16 **C.W.:** June 19-20
Starts: 0001 GMT Saturday
Ends: 0200 GMT Sunday

This year's contest has been moved up a month earlier and once again the United Kingdom is included in the competition.

The W/Ks and VEs may work the U.K. and VP9s only; U.K. stations may work W/K, VE and VP9. Phone and c.w. are separate contests with separate awards and participation is for single operator stations only.

Exchange: RS/RST report plus the QTH. State for W/K, province for VE, county for the U.K. and Parish for the VP9s.

Scoring: Each completed QSO 3 points. The multiplier is determined by the number of Bermuda Parishes worked on each band. (A max. of 9 for each band, 3.5 thru 28 mc)

Awards: A Trophy will be presented to the winner of each section, N.A. and U.K. Certificates signed by His Excellency, The Governor of Bermuda, will be sent to the highest scoring station in each call area, U.S. and Canada, and each U.K. country. (G, GC, GD & etc.)

The Trophies will be presented to the winners at the Radio Society of Bermuda's Annual Banquet to be held October 21st. Transportation and accomodations for a week's stay at one of Bermuda's leading hotels will be provided by the Society.

Trophy winners are ineligible for the same award for a period of two years.

Contestants are expected to compute their own score, check logs for duplicates and sign a statement that all rules and regulations have been observed.

Parish abbreviations: DEV, HAM, PAG, PEM, SAN, SMI, SOU, GEO, WAR.

Logs go to: Radio Society of Bermuda, P.O. Box 275, Hamilton, Bermuda, and received no later than July 31st 1971.

World Telecomm. Contest

C.W.–0000 to 2400 GMT Saturday, May 15
Phone–0000 to 2400 GMT Saturday, May 22

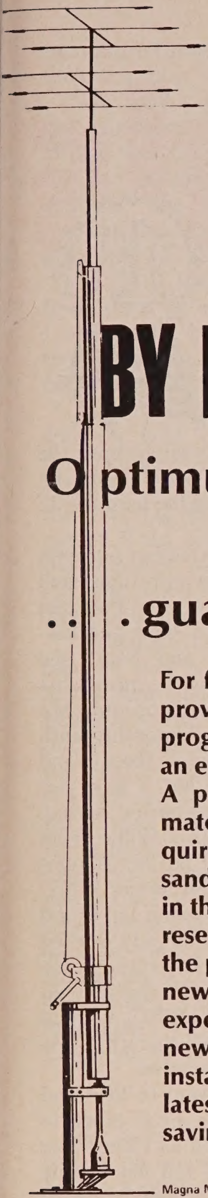
The Brazilian Ministry of Communication announces its second annual contest commemorating "World Telecommunications Day" (May 17th)

Operation is limited to single operator stations fixed or maritime mobile, all bands, 10 thru 160 meters.

Exchange: RS/RST plus your I.T.U. zone.

Scoring: QSO points as follows:

[*Continued on page 92*]


Magna Mast illustrated

ANTENNA PACKAGES BY HENRY RADIO

Optimum performance ... fast service ... guaranteed savings

For four years Henry Radio has been providing a beam antenna-tower program for amateurs who wanted an efficient, but economical package. A package pre-engineered, prematched and pre-packaged to his requirements and pocketbook. Thousands have benefited from this offer in the past. And now Henry Radio has researched the field and up-dated the program ... including the unique new tubular design Mini Mast for less expensive installations and the great new Magna Mast for the more deluxe installations. Now you can get the latest components at the same great savings.

HR-"Mini" Antenna Package

Tristao MM-35 "Mini-Mast"* tubular tower — crank-up
CDR AR-22R Rotator**
100 ft. RG-58A/U Coax
100 ft. 4 Cond. rotor cable
Complete with one of the following antennas:

Hy-Gain TH2MK3	**$260.00**
Hy-Gain TH3JR	**$260.00**
Hy-Gain Hy-Quad	**$290.00**
Hy-Gain 203BA	**$295.00**
Hy-Gain TH3MK3	**$300.00**

*MB-10 Free standing base, add $36.95
**TR-44 Rotator and cable, add $35.00

HR-"Standard" Antenna Package

Tristao CZ-454 crank-up tower w/mast*
CDR TR-44 rotator**
100 ft. RG-58A/U Coax
100 ft. Control cable
Complete with one of the following antennas:

Hy-Gain DB10-15A	**$585.00**
Hy-Gain Hy-Quad	**$600.00**
Hy-Gain 204BA	**$620.00**
Hy-Gain TH3MK3	**$615.00**
Hy-Gain TH6DXX	**$645.00**

*Free-standing base, add $10.00
**Ham-M rotator, RG-8/U Coax, add $50.00

HR-"Magna" Antenna Package

MA-490 "Magna-Mast"
MARB-40 Rotor base
CDR Ham-M Rotator
100 ft. RG-8/U Coax
100 ft. Control cable
Complete with one of the following antennas:

Hy-Gain TH3MK3	**$745.00**
Hy-Gain 204A	**$750.00**
Hy-Gain TH6DXX	**$775.00**

The Magna Mast is ideal for stacked arrays. Write for a quotation on the antenna of your choice.

Freight prepaid to your door in the Continental U.S.A. west of the Rockies. For shipment east of the Rockies add $10.00. Substitutions may be made ... write for prices.

EASY FINANCING • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED EQUIPMENT • Nearly all makes and models. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin. Export inquiries invited.

TED HENRY (W6UOU) **BOB HENRY** (W0ARA) **WALT HENRY** (W6ZN)

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931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

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THE awards PROGRAM

BY ED HOPPER,* W2GT

USA-CA HONOR ROLL

3000	
K5YWX	68
W4IZR	69
K5BTM	70

2500	
K5RPC	99
K5YWX	100
W4IZR	101

2000	
K5RPC	125
K5YWX	126
W4IZZR	127

1500	
K5RPC	157
K5YWX	158
W4IZR	159

1000	
K5RPC	227
K5YWX	228
W6KDI	229
W4IZR	230
K4FPF	231
K1ZSI	232

500	
K5RPC	840
OE2LEL	841

THE May, "Story of The Month" is:

Wilberta Longwell, WA7IRD

After many months of fruitless efforts to get some data from "Willie" for a "Story", her husband, Jerry, WA7GTK came through with this data but he did say that if I never heard from him again, I should figure that she killed him, HI!

"One evening I, Jerry Longwell, WA7-GTK, was talking up a storm with our son Jim, WB6SCH, when Willie stuck her head in the ham shack door and said, "I want to become a ham so I can talk to Jim". Our ham shack, by the way is part ham shack, part bedroom, and now Willie has her sewing machine, ironing board, and would have the cook stove back there if she could figure out how to do it. She lovingly calls the ham shack, "Longwell's Mole Hole".

"Willie" Longwell, WA7IRD.

"Well the next day we started her out with code sight cards, doing a few new ones each day. After one week and a trip to Portland with Willie dit da-ing all the signs and billboards all the way down and back, she graduated on the code part. In the mean time I was trying to funnel a little theory into her pretty head. Everything went smoothly until she would ask "Why"?, about theory and then the arguments started, Hi!. I gave her the Novice test and her waiting period started. On October 19, 1967 I called Willie from town and told her she could put her Knight T-60 on the air using the call letters WN7-IRD. I tore out the 8 miles to home and found when I got there that she had already worked a New York and an Austrian station. No grass grew under her feet! From that day on she had a ball making WAS, WAC, worked 62 DX stations, was 1st WN7 to earn USA-CA-500, and God knows what else.

"About a year later, we went to Portland and I shoved Willie into the FCC office to take the General test. She did as I knew she would–passed the code and fell flat on the theory as she had never cracked a theory book. Using a little psychology, I told her when her Novice ticket ran out that was as far as she would ever go, because she wouldn't study theory. It worked–I made her angry and she was then going *all out* to show me. With my help, plus some more from our Son-in-law, she went to Boise, Idaho one month from the time she took the first test, and passed her General. From that day on, life at WA7GTK and WA7IRD changed! She was on the Independent County Hunter's Net, ISSB and others, and chasing DX, and then more County Hunting until all hours of the morning.

---

*103 Whittman St., Rochelle Park, N.J. 07662.

"We took a trip through Idaho, Nevada and Northern California and I caught heck all the way because we didn't have a rig in the car so she could give out those rare counties. She wanted to repay the many County Hunters who helped her. Many of these fellows have paid us a visit and both Willie and I have enjoyed and treasured the friendships of each and everyone of them. I agree with her, they are the best—really swell people and they are always welcome at our home.

"Finally April 9, 1970 came around when with the help of WA0LRQ, she found her last county—Gosper in Nebraska on the Nebraska WX Net from WA0QEI at 5:20 A.M. I said to myself, Thank Goodness! Now maybe I can have my wife back again, but No such luck. Along came the Minows, ISSB, DX, and others and for many of these she was Net Control . . . We were off again!

"Recently I awoke one morning with a plan of how I might lick the "grey rigs" in the ham shack. Willie awoke at 8 A.M., having been up late working a station down under. I took her by the hand, showed her the plaques, trophies, certificates, etc., that she had earned, and told her how proud of her I was—but—also explained that besides being proud of her accomplishments, that I loved her. I asked her from now on could she please QRT when I was home for coffee or when we had company? Anyway, she finally took the hint and she is back to being my wife again, with still plenty of time for haming. (Wives, you can try this on lost ham husbands . . . GOOD LUCK!)." Signed, Jerry Longwell, WA7GTK."

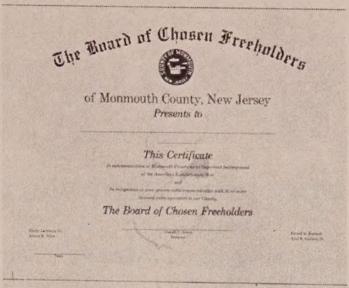
Awards Issued

Ben Davis, K5YWX (now in the Far East), caught up on his paper work and acquired USA-CA-3000 endorsed All Phone; 2500 All A3A Mobiles; and All 14 mc A3A Mobiles 2000, 1500 and 1000.

Gil Barber, W4IZR flooded me with *Record Books* to receive USA-CA-3000 endorsed Mixed; 2500 All s.s.b.; and All 14 mc s.s.b. Mobiles 2000, 1500 and 1000.

Dot Dickensen, K5BTM, after some terrible mishaps, applied for USA-CA-3000-Mixed.

Ray Phillips, K5RPC made his first application a big one and was issued USA-CA-2500 All 14 mc A3A; and All 14 mc A3A mobiles 2000, 1500, 1000, and 500.



The Board of Chosen Freeholders

of Monmouth County, New Jersey

Presents to

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The Board of Chosen Freeholders

Monmouth County Award.

Ed Gregan, K1ZSI was sent a USA-CA-1000 endorsed All 14 mc s.s.b. Mobiles.

Paul Valentino, K4FPF and Ed Van Bosch, W6KDI (ex-WB6HQQ/K9BHE) were recipients of Mixed 1000 awards.

Heinrich Lederer, OE2LEL won a USA-CA-500 award endorsed All A-1. This is the 2nd award to an OE station, OE2EGL having received #1.

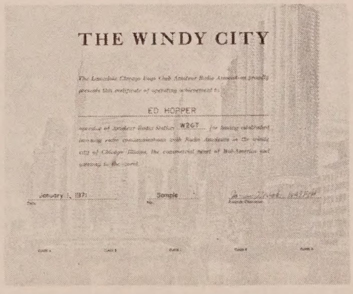
Letter

Dot Dickensen, K5BTM (Foto & Story March '69 *CQ*) writes: "Since sending my last application (1968), I *broke* my *back* in November of 1969, then lost *all* my antennas and beam in an ice storm, and have just been released from the hospital after a bout with pneumonia and angina.

Well 3 weeks ago, Don McCarthy, WA9-PRE/WA0ZZT was sent to Dyess AFB which is 35 miles from me, and you know what? He has my beam all repaired and back up higher and better than ever. He worked 3 Saturdays with my OM Bob, driving over here to do so each week.

ARENT HAMS WONDERFUL!"

[*Continued on page 94*]



THE WINDY CITY

ED HOPPER

W2GT

January 1, 1971

Sample

The Windy City Award.

SURPLUS sidelights

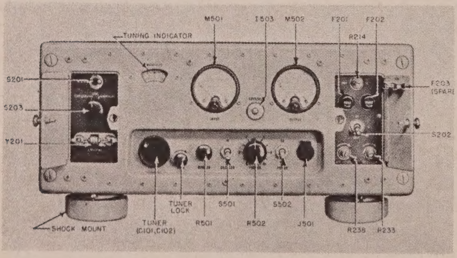
BY GORDON ELIOT WHITE*

I HAVE observed occasionally in these columns that there are no more Command Sets; no more SCR-274-N or AN/ARC-5 systems, which were the Shmoos of World War II surplus—they could be made into almost anything, and were available in vast quantities, like Al Capp's imaginary little animals.

Well there *are* no latter-day Command Sets, but there do seem to be a few useful items beginning to show up in the surplus flow stemming from the winding-down of the Viet Nam war machine. The Navy for example has started to release the AN/URR-13 receivers, a very straight forward Korean War u.h.f. set that has direct application for amateur, s.w.l. and experimenter use. These have been around in small numbers at commercial prices, but are coming out now at less than $100, making them attractive to surplus hounds. I bought some myself for the purpose of digging into them and seeing what can be done with the design.

Basically, the R-266/URR-13 receiver is a superhetrodyne receiver for the reception of a.m. signals in the 224-404 mc band. It offers manual variable tuning, or can be used optionally with crystal-control. Frequency may be read directly on a front panel dial.

Unlike the older RDZ Navy u.h.f. receiver which preceded it, the URR-13 has no cranky autotune contraption to add weight and complexity to the design. It operates off standard 117 volt a.c. power, and all controls and meters are accessible on the front panel. The set weighs 57 pounds, a fraction of the weight of the RDZ.



The R-266/URR-13 receiver front panel showing all controls.

Presumably the receiver can be re-tuned to cover the 220 mc amateur band. Possibly it could be modified to tune the 450 mc u.h.f. band. The frequencies for which it is designed include the military and government aircraft channels, notably Air Force approach, en route, and tower frequencies, and a handful of channels used by the President's plane, Air Force One. I have listened a number of times to Mr. Nixon as his jet checked in at nearby Andrews Air Force Base, landed, was cleared to the terminal, then as we transferred to "Marine One" or "Army One," depending which service was flying the helicopter that evening.

Still using u.h.f. military frequencies, the chopper flies over the hill from Andrews, up to Potomac, across Anacostia, the Tidal Basin, and past the Washington Monument to "hotel," the code name for the landing pad on the South Lawn of the White House.

Other interesting things go on in the u.h.f. military band. Practice jamming is to be heard, and sometimes annoyed calls of "stop buzzer," the code word to call off the jammers if they interfere with non-tactical Air Force communications. I watched and listened to the whole procedure from aloft a while back, in the flight compartment of a Presidential Jetstar courier plane which also used the Air Force frequencies.

"Sky King," and other codes can be detected, involving the flying command posts, U-2 spy planes, and the A-11 (SR-171) aircraft on a variety of interesting missions. Most of what is to be heard is marginally intelligible, but the marvellous antenna height gives a great deal of range to even weak u.h.f. signals from extremely high-flying aircraft.

The set has a jack for use with a panoramic adapter capable of scanning a 600 kilocycle-wide video band, flat according to the specs, within 6 db. Sensitivity is rated better than 8 microvolts for a 10 db signal to noise ratio.

The set can be rack-mounted or used tabletop. Construction is sturdy, with heavy castings forming the r.f. and oscillator tuning and amplifier compartments. The front end of the set consists of a nine-tube chassis with two stages of r.f. amplification, using miniature 9003 variable-Mu pentodes as are used in the excellent v.h.f. Command receivers. Twin 6J6's are used in the mixer stage, giv-

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*5716 N. King's Hwy., Alexandria, Vir. 22303.

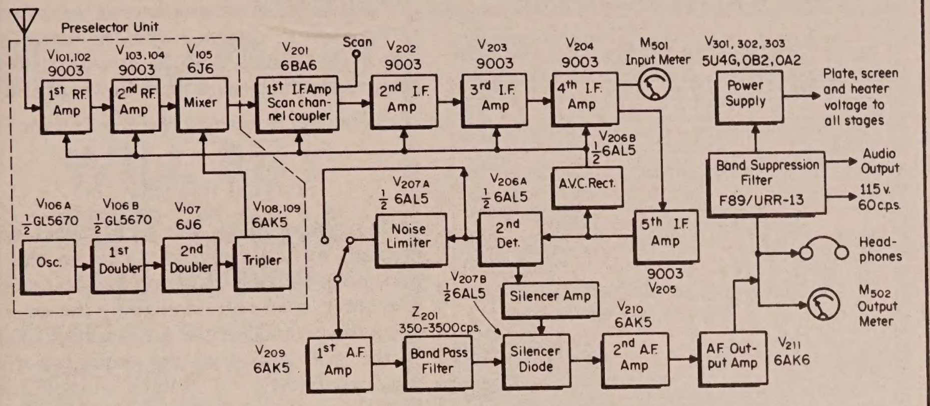
Preselector Unit
V101,102 9003
1st RF Amp
V103,104 9003
2nd RF Amp
V105 6J6
Mixer
V201 6BA6
Scan
1st I.F.Amp Scan channel coupler
V202 9003
2nd I.F. Amp
V203 9003
3rd I.F. Amp
V204 9003
4th I.F. Amp
M501 Input Meter
V301, 302, 303 5U4G, OB2, OA2
Power Supply
Plate, screen and heater voltage to all stages
V206B ½6AL5
A.V.C. Rect.
V207A ½ 6AL5
Noise Limiter
V206A ½ 6AL5
2nd Det.
5th I.F. Amp
9003 V205
Band Suppression Filter F89/URR-13
Audio Output
115 v. 60cps.
Head-phones
M502 Output Meter
V106A ½GL5670
Osc.
V106B ½GL5670
1st Doubler
V107 6J6
2nd Doubler
V108,109 6AK5
Tripler
V207B ½6AL5
Silencer Amp
Z201 350-3500cps.
V210 6AK5
V209 6AK5
1st A.F. Amp
Band Pass Filter
Silencer Diode
2nd A.F. Amp
A.F. Output Amp
V211 6AK6

Fig. 1—Block diagram of URR-13 receiver.

ing an i.f. of 18.6 mc.

The oscillator section consists of two doublers and two triplers, using successively two GL-5670's, a 6J6 and a 6AK5. In the i.f. stages 9003's are again used, with 6AL5's in the detector and automatic volume control circuits. In the audio frequency section you will find more 6AK5's, with various other tubes used for meter rectifiers, video channel amplifiers, etc. All told the set has 23 tubes, counting a 5U4 in the power supply and two regulator tubes.

Input is designed for a 50 ohm dipole or similar antenna, and a matching RG-8/U coaxial feed line. The same coax is used for video (panadapter) output. Audio output is rated at 60 milliwatts into a 600 ohm load.

Stability is rated no worse than .009% under crystal control or 30 parts per million, variably controlled.

Fig. 1 is a block diagram of the AN/URR-13, and fig. 2 shows the r.f. section, with parts identification, which should be helpful to readers seeking to modify the tuning range. The manual for the set is NavShips 91270.

The audio output bandpass as shown in the URR-13 specs is essentially flat from 350 kc to 3,100 kc. I.f. selectivity is 137 kc wide

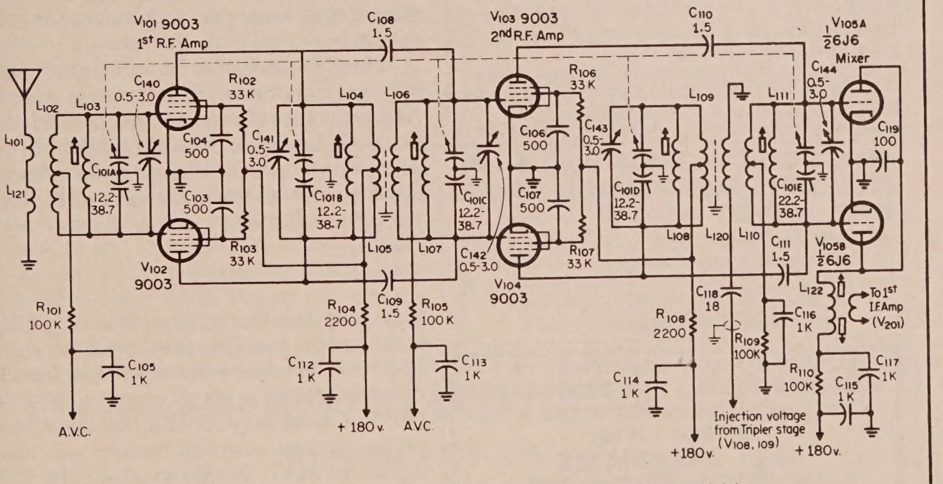
V101 9003
1st R.F. Amp
C108 1.5
V103 9003
2nd R.F. Amp
C110 1.5
V105A ½6J6
Mixer
L102
L103
C140 0.5-3.0
R102 33K
L104
L106
R106 33K
L109
L111
C144 0.5-3.0
L101
L121
C101A 12.2-38.7
C104 500
C103 500
C141 0.5-3.0
C101B 12.2-38.7
C101C 12.2-38.7
C106 500
C107 500
C143 0.5-3.0
C101D 12.2-38.7
C101E 22.2-38.7
C119 100
R103 33K
V102 9003
L105
L107
C142 0.5-3.0
R107 33K
V104 9003
L108
L120
L110
C111 1.5
V105B ½6J6
R101 100K
C105 1K
A.V.C.
R104 2200
C109 1.5
R105 100K
C112 1K
C113 1K
+180 v.
A.V.C.
C118 18
R108 2200
R109 100K
C114 1K
C116 1K
L122
To 1st I.F. Amp (V201)
R110 100K
C115 1K
C117 1K
Injection voltage from Tripler stage (V108, 109)
+180 v.
+180 v.

Fig. 2—Schematic diagram of the input section of the R-266.

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Meas. Corp. generators from the test line of a multi-million dollar Radio mnfr. We bought strictly as-is but at the right price so can sell strictly as-is but at the right price. Instruction Book with each! No. 65B is the FAA's favorite because the CW can also be AM up to 100%. 75 khz to 30 mhz, manual or motor-driven. Calib. vo 0.1 uv to 2.2 Volts across 50 ohm load.

No. 65B Overhauled & Certified, w/book. $450.00

Meas. Corp. No. 82: 20 Hz to 50 MHz CW or AM up to 50%. Output calib. to 1 v into 50 ohms. It is the only LF Gen. with Piston Attenuator: easy to use, no resistor burnouts. As is, w/book. $195.00

Gen. Radio 1001A .005-50 mhz OHC, w/book $395.00

URM-25 compact .01-50 mhz, OHC, w/book $275.00
URM-25D adds xtl calib., OHC, w/book $350.00
Hewl-Packard No. 606A, like new, OHC, book $950.00

Signal Generator Similar H.P.'s 608D:
Marconi TF-801D/1: 10 to 470 mhz, CW & AM up to 90%. Crystal-calibrated each 2 and 5 mhz and moveable cursor (hairline indicator) to reset the dial at each zero beat, gives freq. accuracy 0.01%. Standard 50 ohm Zo from Type N plug. Vo calib. accurately 0.1 uv to 1 v, Leakage & FM too low to measure. Capacity-coupled contactless turret bandswitching eliminates down time. Very handsome design, carefully engineered $1650.00 Instrument. Like new appearance, completely overhauled, with calib. sticker and certificate traceable to N.B.S., w/book. **$595.00**

Hewl-Pack 608A 10-500 mhz, OHC, w/book. $495.00
Hewl-Pack 608B 10-400 mhz, OHC, w/book. $450.00
MIL No. 608D (TS-510A) OHC, w/608D book. $750.00

Boonton No. 202B FM-AM generator 54 to 216 mhz; deviation calib. on meter 0-24, 0-80, and 0-240 khz: AM calib. on meter 0-50%. OHC, w/book. $375.00

New London No. 100D: 27-230 mhz, FM, deviation 0-30 & 0-250 khz, calib. Vo, a gorgeous setup, like new, OHC, w/book, satisfaction guaranteed. $375.00

SG132 has 5" scope to see while aligning. AM/FM, 15-400 mhz, dev. to 600 khz. Like MIL AN/TRM-3, w/book on TRM-3. Looks fair condition, as is only. $250.00

Jerrold No. 900A with D50 Detector: Sweep Generator 200 khz to 900 mhz; swp width 100 khz to 200 mhz; OHC, with book. $595.00

Jerrold No. 900B: Later model, OHC, with book. ... $750.00

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H.P. 523C, 6 nixies $295.00
Beck, 7360, 7 DCU's............... $225.00
H.P. 5223L Solid-State 300 kHz Universal............. $475.00
5233L Solid-State 2 mHz Universal $595.00
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at the 6 db point.

The set is designed for the barrel-type CR-24/U crystals, and the crystal frequency may be obtained from the following formula:

$$\frac{\text{channel frequency (MC)} + 18.6\text{ mc}}{12} = \text{crystal frequency, mc}$$

The photo shows the front panel doors opened, with the crystal socket in the left side, along with the CRYSTAL/MANUAL switch. The latter, used only in aligning the set, connects the cathode of the a.v.c. tube V-206-B, to the grid return of the oscillator tripler stage, giving an a.v.c. reading on input meter M-501, as the oscillator chain is tuned to resonance.

The right panel door covers the fuses, and pots to set the input (S) meter, audio level, and silencer (squelch) level. A toggle switch controls the noise limiter in/out.

The main panel controls include, left to right, the MAIN TUNING knob, TUNING LOCK, PANEL LIGHT DIMMER CONTROL, SQUELCH ON/OFF, AUDIO LEVEL, MAIN POWER SWITCH, and PHONE OUTPUT JACK.

The light above the audio level knob lights to indicate that the set is on crystal control. It will double as a B-plus power indicator as well. The meters, input and output, are of course r.f. in and audio out.

The receiver has built in to it a small blower to keep the set cool despite its tightly fitting case. In some of the sets seen in surplus the blower is thermostatically controlled, others are wired in a permanently "on" condition.

When opening the set, the main chassis may be withdrawn from the case after the four Dzuz type fasteners at the corners of the panel are loosened. Stop mechanisms in each side rail prevent the chassis from falling all the way out of the case unless depressed through finger holes in the bottom of the chassis.

Corrections

A couple of corrections: the AN/PRC-6 set, listed in the February column, is f.m., 47-55 mc. This was incorrectly identified. The AN/PRC-8 was properly shown as 20-28 mc f.m. In the January column, the latest model Collins general coverage receiver was identified as the 51S1. Strictly speaking, the 651S1 is later. It is a $4,500 solid state 2-32 mc set, designed to be used with computers, in fact

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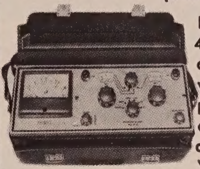

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may be tuned via a digital data system. The successor to the R-390-A however, Collins assures me, is still the 51S1, a digitally tuned 2-32 mc receiver which sells at a list price of $1,946.

Hammarlund Manufacturing Company also advises me that they have bought the R-390-A tooling and drawings, and are in current production, at Mars Hill, North Carolina. Their R-390-A sells today at $1,495, about half of what Collins sold them for, seven or eight years ago. It presumably meets the same mil specs as the earlier Collins sets.

The 51S1 is, as the nomeclature indicates, designed in the S-line style, rather than the military "look" of the R-390-A. It covers 2-30 mc, with a 55G-1 preselector available for the 200 kc—2 mc bands. Tuning is done on a digital type counter. The receiver offers dual and triple conversion, it uses 15 tubes and 10 transistors and diodes, and uses mechanical filters in s.s.b. modes only. Interpolation accuracy of 400 c.p.s. is not quite as good as the 390-A (300 c.p.s.) but on the other hand a Q-notch filter is offered. Sensitivity ranges down to 0.6 microvolt in s.s.b. A 6 kc mechanical filter for the a.m. mode is also available. The weight of 28 pounds is a fraction of the R-390-A. The 651-S-1 is designed with the later Collins "square" styling, has Nixie tube digital frequency readout, and covers 400 kc-30 mc. Internal oscillator is via phase-locked digital synthesizer. Stability is rated 5 parts in 10^7. Weight is 15 pounds. ■

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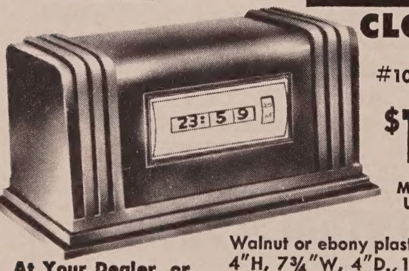

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F.M. *[from page 67]*

Repeaters may be closed to permit special operating goals or to facilitate member control privileges to change functions and modes. A closed repeater operates on frequencies not recognized as "open" repeater pairs. A repeater may have both open and closed modes when operating on different frequencies.

3. Open repeater frequencies: The CARC recognizes the following open repeater frequencies:

Input	Output
146.16	146.76
146.34	146.94
52.76	52.525

Other in-band pairings of these frequencies is not recommended. Local agreements requiring only simplex operation on any of these frequencies should take precedence. A repeater need not operate on these frequencies to be an open repeater, but any repeater operating on these frequencies will be considered an open repeater. Long dropout times or continuous carrier operation on these frequencies is not recommended so that simplex operation will also be possible.

The other resolution dealing with off-the-shelf equipment recommends that the following transmit and receiver channels be installed only. Other crystals could be ordered if needed.

Transmit	Receive
146.16	146.76
146.34	146.94
146.76	
146.94	

The next meeting of the CARC will be held in Los Angeles on June 5, 1971. The exact time and place information will be available after May 8, from Les Cobb, W6TEE, Chairman CARC, 4124 Pasadena Avenue, Sacramento, California 95821. Please enclose a s.a.s.e. Tours of amateur mountain top sites will be conducted on the day following the meeting. Everyone interested in the workings of the CARC is welcome to attend (information supplied by W6TEE).

Finale

The reader response is improving greatly. People like W6TEE are keeping the author informed on specific parts of the country. However, there is never enough "grass roots" news and especially photographs. Remember that this column is to promote f.m., and f.m.'ers need promote this column.

Well, I keep using more space than any of the other columns, so I had better start cutting it off. Keep the news coming in. No Q & A this month, but will have some more next month. Please include s.a.s.e with all questions, and try

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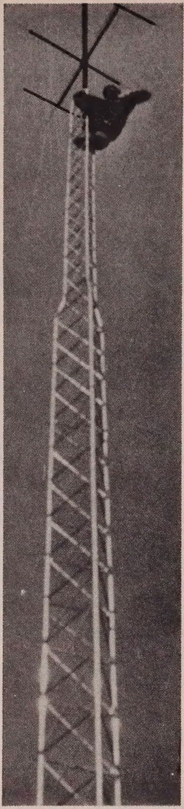

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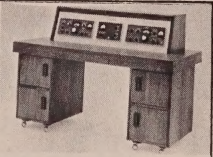

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to make your writing legible if using long-hand. Also, place return address on your letter, just in case I get more information to pass along later, long after the original envelope has been discarded. I keep all questions letters in a special file, and try to update the answers where required. Again, I need photographs of interest to f.m.'ers. See you in Orlando. ■

Contest Calendar [*from page 82*]

	10/15/20	40	80/160
Same country	0	0	0
Other countries same Zone	1	1	2
Other Zones same continent	2	3	4
Other continents	3	5	6

Final Score: Total QSO points multiplied by number of different I.T.U. Zones worked. (The same station may be worked on different bands for QSO points but Zone is counted only once.)

Awards: Diplomas to the three highest scoring stations in each country. Gold, silver and bronze medals to the three top stations in the world. (Awards for both c.w. and phone)

The I.T.U. Trophy goes to the country with the highest aggregate score determined by the mathematical average of the scores of the ten top contestants of that country. The Trophy remains in the possession of the national association, affiliated with the I.A.R.U. for a period of one year and permanently retired if won 3 times within a 5 year period.

Separate logs are required for phone and c.w., include a summary sheet and signed declaration and mail before June 30th to: DENTEL, P.O. Box 1219, ZC00, Rio de Janeiro—GB, Brazil.

YL ISSBers QSO Party

Starts: 2300 GMT Friday, May 21
Ends: 2400 GMT Sunday, May 23

This one has a complicated scoring system and it is highly recommended that you write to Contest Chairman W4AAA for detailed rules.

The same station may be contacted on different bands and modes for QSO points but the multiplier is counted only once.

Catagories: 1. DX/WK teams. 2. YL/OM teams. 3. Single operator. (non-members enter this catagory only)

Exchange: RS/RST, name, ISSB nr., state/country/or province, zone, partner's call if a team station. (non-members send "no nr.")

Points: Member to member 2 points if stateside, or own country, 5 points if DX or other country. Contacts between non-members and ISSB and non-members, 1 point. Contacts made on c.w. have double the above QSO point value.

Multiplier: Sum of different prefixes, countries, states, VE provinces, zones and teams

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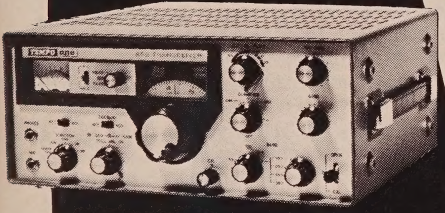

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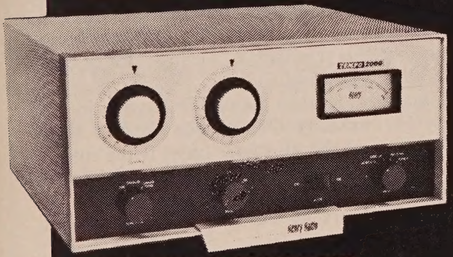

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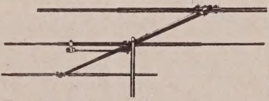

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when both members are worked. (KH6 & KL7 count as both country and state)

Final Score: Total QSO points times the total multiplier.

Frequencies: C.W.–3565, 7065, 14070, 21070, 28070. Phone–3973, 7273, 14332, 21373, 28673. DX may use 3773, 7090, 14332.

Awards: Certificates to the first 3 places in the many catagories and sections. There are also Trophies and Plaques for world leaders.

Logs must show 6 continuous hours of rest in each 24 hour period, and to qualify for a Trophy the contestant must show at least 2 hours of CW operation.

Contest logs, requests for DX/WK team pairing and other information go to: John Propst, W4AAA, 8619 w. Park, Ft. Myers, Fla. 33901. All logs must be postmarked within 30 days of end of contest.

The footnote at the end of my Column for February was a bit misleading.

A close analysis of this regulation seems to indicate that we are prohibited from interfering with broadcasters in Region I and III who operate in our portion of the 40 meter phone band. Personally I fail to see why contracting a station outside our own Region in another portion of the band would cause any more QRM than if the QSO was with someone state-side.

And isn't it a bit ridiculous to think that a "ham" transmitter could possibly cause any more QRM than the multi-kilowatt broadcasters that make operating between 7200 and 7300 kc a nightmare.

This is not a new regulation, its been in the book for some time. Recently however it was made an issue by someone with a different interpretation of this regulation, causing a lot of confusion and frustration.

We are not about to disqualify anyone in our contest for working DX outside Region II in another part of the 40 meter band if the operation is legal according to the regulations of that country. Unless the station has been cited by the FCC, and to date we have not heard of any such citations.

The above is in answer to the many letters and phone calls I have received.

73 for now, Frank, W1WY

USA-CA [*from page 85*]

Monmouth County Certificate: Issued free by The Board of Chosen Freeholders of Monmouth County, New Jersey for contacts with at least 25 of the some 1200 amateurs in Monmouth County. Send list including name and call letters and date and time of QSO to the County Promotion Department, Hall of Records, Freehold, N.J. 07728. Lists will be

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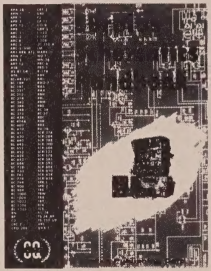

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Belleville Certificate: Issued through the courtesy of the Honorable Mayor Kenneth A. Smith of Belleville, N.J. (Essex County) and his fine staff of Officials in Celebration of Radio Amateur Week, 0400Z Monday June 21 to 0400Z Saturday June 26, 1971. Sponsored by the Belleville Radio Amateur Club. Work Belleville RAC Members on: Novice—3735, 7175, 21110; v.h.f.—50 and 144 mc; Others—3560, 7060, 14060, 21060, 28060, 3960, 7260, 14300, 21360, 28560. Send QSL cards and self-addressed-stamped-envelope to W2FOY, Belleville Radio Amateur Club, Belleville Recreation Hall, 407 Joralemon St., Belleville, N.J. 07109.

The Windy City Award: Sponsored by the Lawndale Chicago Boys Club ARC, K9YHB. Made available for working stations in Chicago in the following classes: A-100 Chicago stations; B-75; C-50; D-25 (Basic award for W/K stations); E-15 (Basic for DX, Novices and v.h.f. stations more than 100 miles from Chicago). Applicants should send a GCR list showing full log data with 50¢ or 5 IRCs. Endorsements for higher class, s.a.s.e. or 1 IRC. Applications may be sent to: James Novak, WA9FIH, 2513 South Austin Blvd., Cicero, Illinois 60650. NOTE—The LBS/ARA Worked Five Member Award as illustrated in my August 1966 column. is still available, free of charge. Rules are the same except that v.h.f. stations more than 100 miles from Chicago need contact only 3 members for the basic award, with endorsements for 5 and 10.

Notes

If this column should seem a bit ethereal, it is because "flu" knocked me on my ear for a week—believe the same thing happened about 2 years ago.

A reminder of the 1971 County Hunters c.w. Contest 0000 Z July 24 to 2400 Z July 25th. Suggested freq.—3575, 7055, 14070, 21070, and 28070. Logs go to Jeffrey P. Bechner, K0WNV, 42 East Signal Drive, Rapid City, S. D. 57701. See CONTEST CALENDAR for full details. Last year over 400 counties active, make this a BIG one!

Again many thanks to JA1EL and JA1-ELL for rushing via air mail an autographed copy of the latest JARL-CQ Award Manual for Radio Amateurs.

How was your month? 73, Ed., W2GT.

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Transceive with R-4B or T-4XB VFO or use separately. **$495.00**

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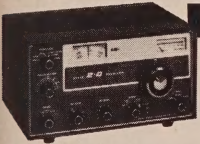
• 2000W PEP-SSB, 1000W AM, CW, RTTY • Class B Gnd Grid • Broad Band Tuned Input • RF Neg Feedback • Xmit AGC • Directional Wattmeter • Taut-band Meters • Plate Current Meter meets FCC reg • Quiet hi-volume blower.

Amateur Net $825.00 Incl. sep. sol-st. Power Supply

HAMS SAY . . . ***"Best Receiver buy since the 2-B"***



2-C Receiver

• Xtal control 1st converter • 500 kHz Ranges: 80, 40, 20, 15, 10 meters • Accessory Ranges 3-30 MHz • SSB-AM-CW • Accessories: Spkr, Q-Mult, Calib, Noise Blanker, Xtals.

Amateur Net $255.00

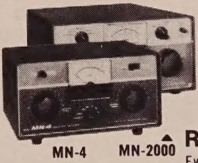
CW Transmitter 2-NT

• 100 (or 75) watts • Break-in CW with 2-C • 80, 40, 20, 15, 10 mtrs xtal controlled • Ant. Relay • Sidetone • LP Filter • Pwr. Sup. incl.

Amateur Net $164.00

TR-44B Communications Station • Consists of R-4B and T-4B in same cabinet • Less power supply and crystals **$975.00**

DRAKE 4 LINE ACCESSORIES

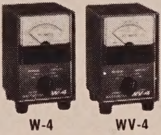


Matching Networks

Integral Wattmeter: fwd pwr in watts and VSWR direct • Can read refl pwr • Matches xmtr to ant VSWR 5:1

MN-4	200 watts	**$ 99.00**
MN-2000	2000 watts PEP	**$195.00**

RF Wattmeters

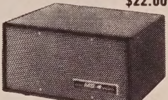


Fwd and refl pwr directly in watts • Two scales each direction • Calib Acc: ±(5% of reading + 1% of full scale)

Model	Range	Full Scale	Price
W-4	1.8-54 MHz	200/2000W	**$61.95**
WV-4	20-200 MHz	100/1000W	**$73.50**

Matching Speaker MS-4

5"x7" speaker, space for power supply **$22.00**



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60-8000 Hz, ceramic, Hi-Z, highly directional, plug . . .
Model 729-SRD **$17.00**
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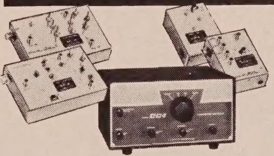
TV-1000-LP	Low Pass Filter	18.75
TV-100-LP	Low Pass Filter	6.50
TV-CB-LP	Citizens Band	7.65
TV-300-FMS	FM Band Stop	4.95
TV-300-FMI	FM Tuneable	4.95
LN-4	Power Line Filter	8.00

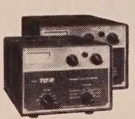
DRAKE 2 and 6 Meter CONVERTERS



For Receivers

FET, Lo Noise, Uniform Gain, Low Spurious Response

6 meters—**SC-6**	**$71.00**
2 meters—**SC-2**	**$76.00**
Power Supply **CPS-1**	**$19.75**
VHF Xtal Cal **SCC-1**	**$26.95**
Console **CC-1**	**$26.95**



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TC-2 • Entire 2-meter band • 180 watt input
TC-6 • All of 6-meter band • 300 watt input

BOTH: • Xmit AGC—no flat top • Antenna Relay • Need no separate pwr supply with Drake xmtrs. **TC-2 $300.00; TC-6 $250.00**

SPR-4 PROGRAMABLE RECEIVER • All solid state • 1 kHz acc. dial • 3 bandwidths • SSB-AM-CW • 24 500 kHz ranges 150 kHz-30 MHz (10 ranges furn., others $5 ea.) • 12 VDC/120 VAC • Acces avail: Calib, Noise Blanker, Notch. **$499.95**

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MINEOLA, N.Y. 11501 525 Jericho Turnpike, One Half Block East of Herricks Road
TOTOWA, N.J. 07511 225 Route 46, 201-256-8555
NORWALK, CONN. 06850 18 Isaac Street, Shopping Pl., 203-838-4877

FCC Proposal [from page 58]

(b) *General and Conditional Class.* All authorized amateur privileges except those exclusive frequency operating privileges which are reserved to the Advanced and/or the Amateur Extra Class but including operating privileges in the band 7075-7100 kc/s with telegraphy, and with telephony when located outside Region 2 (Refer to §97.95 (b) (2) for a description of Region 2).

* * * * *

(d) *Novice Class.* Those amateur privileges designated and limited as follows:

* * * * *

(2) Radiotelegraphy is authorized in the frequency bands 3700-3750 kc/s, 7100-7150 kc/s (7050-7075 kc/s when located outside Region 2), 21100-21200 kc/s, and 28150-28250 kc/s, using only type A-1 emission and 145-147 Mc/s, using radiotelegraphy emissions as set forth in §97.61. Refer to §97.95 (b) (2) for a description of Region 2.

* * * * *

2. In §97.61, the table in paragraph (a) is amended and, paragraph (b), subparagraph (10) is added to read as follows:

§97.61 Authorized frequencies and emissions.

(a) * * *

Frequency band	Emissions	Limitations (see paragraph (b))
kc/s		
1800-2000	A1, A3	1, 2
3500-4000	A1	
3500-3750	F1	
3750-3875	A5, F5	
3750-4000	A3, F3	4
7000-7300	A1	3, 4
7000-7075	F1	
7075-7100	A3, F3, A5, F5	10
7100-7150	F1	3, 4
7150-7225	A5, F5	3, 4
7150-7300	A3, F3	3, 4
14000-14350	A1	
14000-14150	F1	
14150-14250	A5, F5	
14150-14350	A3, F3	
Mc/s		
21.00-21.45	A1	
21.00-21.20	F1	
21.200-21.325	A5, F5	
21.20-21.45	A3, F3	
28.00-29.70	A1	
28.00-28.35	F1	
28.35-29.70	A3, F3, A5, F5	
* * *	* * *	* * *

(b) * * *

(10) The use of telephony in this band is limited to the calling of, and the exchange of communications with, amateur stations located outside Region 2. Refer to §97.95 (b) (2) for a description of Region 2.

Letters [*From page 10*]

lated and restricted channelized use of 2 mc of the 5 mc wide band with 25 watt output type-approved equipment and suitable antenna restrictions. EIA would call the new licensees Class E CBers with no attempt of sugar-coat an unpleasant pill for amateur radio to swallow by calling them amateurs.

Our stand is this: We feel that the answer to the problems of the Citizens Radio Service lies somewhere *other* than the amateur bands. The 465 mc band already exists under the auspices of the Citizens Radio Service. Perhaps the answer to CB's overcrówding problem lies here.

The answers to amateur radio's own population problems may or may not be found in a Junior class amateur license class, but if that's where they lie, let us approach those answers from the point of view of *amateur radio's* needs, not CB's needs.

The number of Novices licensed stands, as of January 4, 1971, at over 22,000, a number that has been static for years. Considering the 2-year term of the Novice license, that's nearly 1000 new Novices per month, every month. Just what the conversion rate is of Novices to higher class licensees is difficult to determine, but a conversion rate of only 50% still would produce an annual growth of over 5000 amateurs per year were it not for regular declines in the number of amateurs in the Conditional, Technician and General classes.

But activity on the amateur bands has not decreased one iota to which the din on any of the amateur bands from 160 to 2-meters will testify. This now brings up the point of whether amateurs, their societies, industry groups and magazines have been innocently playing a deluding numbers game. Is the significant value in our amateur population the number of new amateurs, the number of active amateurs, the number of buying amateurs or is it the statistical total number of licensed amateurs? Each interest group has its own significant value. Manufacturers want to know that the numbers of amateurs buying parts and equipment is growing or at least not declining. Amateur magazines and societies are also virtally concerned with the buying amateur as well as the newcomer and all such principles engage in out-and-out competition for the favors of the man with a few extra dollars in his pocket. But the number that is bandied about most is the total number of licensees, a figure of no real significance to any interest except our egos and to statisticians. Is there any study which has realistically determined whether the ratio of licensees to active amateurs has risen or declined? Not to our knowledge.

Summarizing this too-long statement, 1. *CQ* has never proposed a defacto merger of amateur radio and CB. W2NSD is totally and wilfully wrong in his recent accusations. 2. The only invitation to the opening of the amateur frequencies to CB operation coming from within amateur radio was proposed by W2NSD. 3. *CQ* is opposed to the indiscriminant institution of CB-type operation on any portion of any amateur band. 4. If indeed the major problem facing amateur radio is the static licensee population then let us seek ways within the spirit and character of amateur radio to solve that problem.

—K2MGA

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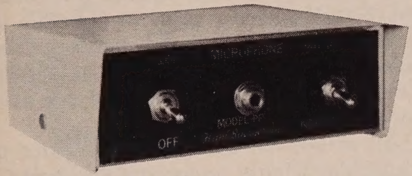

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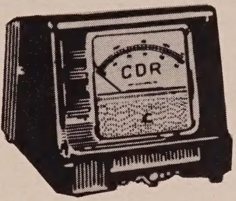

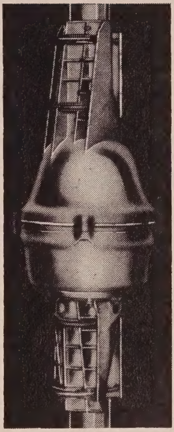

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HAM NET WITH
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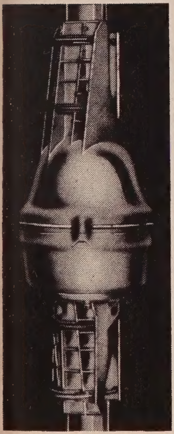

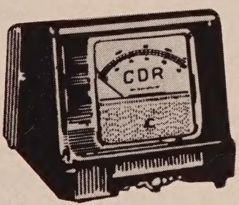

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REGULAR HAM NET—
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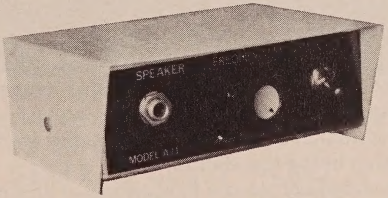
SPECIAL HAM NET WITH
100 FT. 8 WIRE CABLE



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IF YOU OWN A RECEIVER OR TRANSCEIVER THAT YOU WOULD LIKE TO INCREASE THE SELECTIVITY IN THE CW MODE AND REDUCE THE GENERAL QRN, YOU NEED THIS EASY TO INSTALL DEVICE. AUDIO SELECTIVITY VARIABLE FROM 100 CPS TO 8000 CPS CONTINUOUSLY. CONNECTS TO 4 OHM OUTPUT AND INPUT. THIS IS THE FINEST AUDIO FILTER IN THIS PRICE CLASS.

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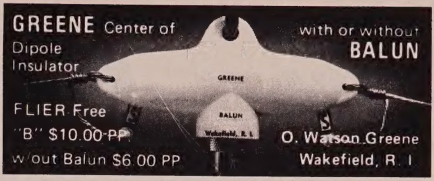
HAM NET **$9.95**



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with or without **BALUN**

FLIER Free
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w/out Balun $6.00 PP

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BE SURE TO READ PAGES 52 AND 56

Drake Marker [*from page 70*]

rate home battery-eliminator or power supply.

The use of JFET's in all high and medium frequency amplifiers and mixers results in lower internally generated noise and better sensitivity in the receiver.

The rapidly growing number of channels in use in various areas demands a multiple channel rig, thus the merit of the 12-channel capability. Also, various crystal positions may be strapped, for instance, to use a single transmit crystal with two or three different receive crystals.

There is no need to purchase additional gear for a complete mobile rig, as all accessories, including the antenna, are furnished. For base station use only an antenna and feedline are needed.

Although provision is made for an external speaker, it was not needed with the test unit, as the small internal speaker gives excellent reproduction. This is exceptional for internal speakers.

The final bouquet is the high quality workmanship in the tested unit.

As stated before any final choice of an f.m. transceiver must be made by the amateur concerned. Various factors, not the least of which is cost, must be considered. The Drake Marker Luxury is available from many local amateur dealers for $329.95. Further details are available from R. L. Drake Company, 540 Richard Street, Miamisburg, Ohio 45342.

—K9STH/5

Old Converter [*from page 45*]

at approximately 10 volts. We found by experiment that a 560 ohm 2 watt series resistor produced about the right voltage drop for the solid state part. Other converters would be different but a little figuring will reveal the necessary resistor. In case of doubt start experimenting with a too-small resistor such as 470 ohms. If you get 6 volts drop across it then you know a 560 ohm resistor would be okay to try. Since converters in general will have chassis ground it will be necessary to isolate the solid state i.f./detector unit from chassis. The B— will actually be about —10 volts with respect to the chassis. We mounted the phone jack on a piece of masonite in a tube socket type hole in the chassis to keep it above chassis ground. The rest of the solid state circuitry was built on a vector board, and is not critical as to layout.

All in all, the old mobile converter performs like a fairly respectable receiver. Certainly it is good enough for the neophyte starting out. And if you have a cabin in the mountains or on the lake shore where you wouldn't care to leave a $500 piece of gear unattended, it will serve for a pretty useable all band receiver for s.s.b. or c.w. And nobody in their right mind would steal it. Besides it's kind of fun to resurect an old piece of junk and make it useful again. ■

Q & A [*from page 76*]

transmitter to be used, we can offer no suggestions. Nevertheless, it would be helpful if any of our readers know of any such modifications for use with a particular transmitter. How about it fella's?

Heath SB-500 and HW-17-2 Compatibility Data

For those desiring to employ the Heath SB-500 2-Meter Transceiver with equipment other than the Heath SB-Line, we suggest writing to Heath for their data on "SB-500 Compatibility Information." Similar data also is available for the HW-17-2 F.M. Adapter compatibility with gear other than the HW-17 2-meter a.m. transceiver. Address your request to W. J. Remer, Technical Consultant, Heath Company, Benton Harbor, Michigan 49022.

Manual Appeal

We have a request for a manual for the Multi Elmac AF-67 Transmitter. We'd appreciate it if any of our readers, who have such, make arrangements to forward one or a Xerox copy to John J. Gaudio, K7VIN, 2612 E. Sandra Terrace, Phoenix, Arizona 85032. It is suggested that John be contacted first.

73, Bill, W2AEF

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NEW
W2AU BALUN and LIGHTNING ARRESTER
Mfgd. By Unadilla Radiation Products Unadilla, N. Y.
MODEL 1-1
DBL. PLATED SILVER SO239

IT'S WHAT'S INSIDE THAT COUNTS!

HANDLES FULL KW INPUT – THEN SOME. Broad-Banded 3 to 40 Mc.
HELPS TVI PROBLEMS By Reducing Coax Line Radiation.
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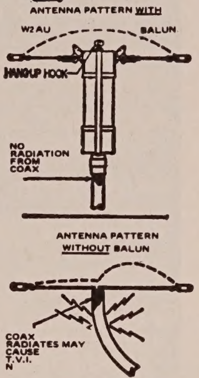
BUILT-IN HANG-UP HOOK. Ideal for Inverted Vees, Multi-Band Antennas, Dipoles, Beam and Quads.
NOW BEING USED EXTENSIVELY BY ALL BRANCHES OF THE U. S. ARMED FORCES, FAA, RCA, FCC, CIA, CANADIAN DEFENSE DEPT. PLUS THOUSANDS OF HAMS THE WORLD OVER.



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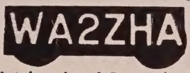

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Blind Hams [*from page 27*]

By mastering the content of the lessons, the prospective ham prepares himself to take the FCC examination for the General Class amateur license. So far the Hadley graduates have a perfect record: the FCC test has been successfully passed by every one who has taken it.

One graduate now puts it, "My only regret is in now realizing what I've missed by not getting into amateur radio years ago."

Under the volunteer chairmanship of Mr. Sharpe, the Hadley Radio Department maintains an active club with its own station, WA9WHS. The group conducts informal on-the-air meetings every Saturday morning.

The Radio Department welcomes inquiries about its course and its club. All communications should be addressed to the Hadley School for the Blind, 700 Elm Street, Winnetka, Illinois 60093. ■

DX [*from page 75*]

awards before leaving for KH6-land in 1966. He now holds many DX awards including WAZ, WPX, WAC on 10-80 meter s.s.b. and RTTY, DXCC, WAE, DUF-4, WAK, WAKI, WAO, WAP, plus such domestic awards as USA-CA and WAS. He also has major contest trophies to his credit including the 1968 and 1969 first spot for Hawaii and Oceania in the *CQ* World Wide DX Contests, and was a 1968 winner in the *CQ* 160 meter contest. He has worked 270 countries with 255 confirmed.

Ed's first expedition was to Kalawao County Hawaii in 1968, after which he operated VR3DY. In March of '69 he was on from KS6, 5W1, and FW8. He is president of the Aloha DX Club and founder of the Pacific DX Net. Now 29 years old, he has an understanding XYL and 2 junior ops in the shack.

QSL Information

The following volunteer to serve as QSL Managers for any DX station needing a manager in the U.S.: W2BHK, 1 Saddle Ridge Road, Ashland, N.J. 08034; WA2MSF, 110 Sycamore Circle, Stony Brook, N.Y. 11790; WN6AIV, 10460 Le Conte Ave., Los Angeles, Ca. 90024; and K9BQL, 206 Sweetbriar Place, Plano, Ill. 60545.

A2CAW–Via WB8BTU.
CR6CA–To VE3GNM.
CT2BC–c/o W4SYL.
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CQ to announce major subscription price increase

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The newly announced postal rate increases, coupled with rising costs for printing and labor, will force us to announce a major subscription price increase in the very near future.

In order to protect our regular subscribers, we're making this information known in advance to allow you to order long-term subscriptions and save $$$$. Newsstand prices are already up to $1.00 per month or $12.00 per year. The savings on these long-term subs will be substantial. And when we say long-term, we really mean it. These rates are offered for a limited time only and may be withdrawn at any time.

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10-MINUTE STATION
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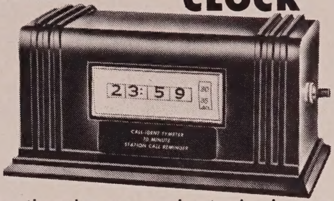

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10-minute repeating timer buzzes warning to sign in your call letters. Walnut or ebony plastic case. 4"H, 7¾"W, 4"D. 110V, 60 cy. One Year Guarantee. Made in U.S.A.

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B&W COAXIAL SWITCH Model 550A
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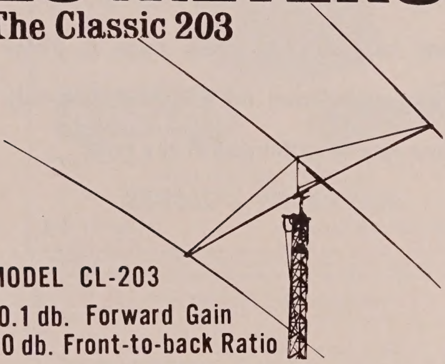

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Incorporating the Mosley Electronic patented Classic Feed System, this full size monobander has 1-1/2" to 3/8" dia. "swaged" elements wide spaced on 2" dia. 24' boom. Maximum element length ---37' 8-1/2" TWENTY-FIVE YEARS of manufacturing know-how is reflected in this Anniversary Model Get the facts....See your Mosley Dealer or write: Department 207.

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FG7XT—Via K5GWR.
FK8AC—To WA6NWG.
FM7WE—c/o K4CFB.
FO8BX—Via W6NTQ.
HK0BKX—To WA6AHF.
HS1ADX—c/o W4VFP.
HS3AEL—Glen Whitehouse, Box 7035, APO San Francisco, Ca. 96304.
HS3AEM—K1USO, 33 Motyka St., Ludlow, Ma. 01056.
JD1ABO—Via JA1BA.
K3QOS/KB6—To K3RLY.
KA1E—c/o W4UC.
KC4USX—To K2BPP.
KM6CB—Via KH6HCM.
KR6AY—To K0VXU.
KR6FT & KG6JAR—c/o J. J. Frekot, Box 123, USNAVCOMSTA, FPO, San Francisco 96630.
KV4FZ—Via W2GHK, P.O. Box 7388, Newark, N.J. 07107.
ON5DO/AP2—To ON5KL.
OY7ML—c/o W2GHK.
PJ8AR—Via W3HNK.
PJ9AE—To W3HNK.
TA3GB—c/o W2FXA, 77 South Pierce St., Buffalo, N.Y. 14206.
TJ1AD—Via F2AD.
TU2CX—To W4VPD.
TY7ATF—c/o K3RLY.
TZ2AZ—Via DJ1QP.
VK9XI—To W2GHK.
VP2DAJ—c/o VE3EWY.
VP2EE—Via W9ZRX.
VR1O—To G3NRA.
VR2FO—c/o W2FXA.
VS6DO—Via W2GHK.
VU5KV—P.O. Box 3031, New Delhi, India (Include 5 IRC's)
XW8DK—To WA6NFC.
XV5HH—c/o W9JT.
YB0AAO—Via DJ0RR.
YN1ZZ—To DL3OH.
ZE1BT—Via WA1IRY.
ZK1CD—c/o ZL2FA.
ZS3AW—Via DJ3KR.
ZS6YK—c/o WB2JYM.
3A2EE—To F9RM.
3V8AL—c/o W4WHF.
5U7AW—Via VE2DCY.
5Z4JP—To W5ZXS.
5Z4LW—c/o K8UDJ.
6Y5GB—Via VE3DLC.
7P8AB—To W2LGU.
7X7MD—c/o I1IJ.
9G1SS—Via W2BHK, 1 Saddle Ridge Rd., Ashland, N.J. 08034.
9H1CD—To W2LGU.
9J2EA—c/o WA1HAA, 238 Slater St., Attleboro, Mass. 02703.
9J2PM—Via WA7ICK.
9J2RO—To WA1HAA.
9K2AN—P. O. Box 736, Safat, Kuwait, Kuwait.
9N1RA—c/o K6OE.
9X5AA—Via W1YRC.
9Y4VT—To W3DJZ.

73, John, K4IIF

July 9, 10, and 11, 1971

RADIO EXPO '71

Seventy years ago Guglielmo Marconi successfully received radio signals in the United States from across the Atlantic. Since that time, the skills and talents of Radio Operators have played an important part in the growth of the communications industry. You are invited to see just how far we have come at RADIO EXPO '71.

JUDGE FOR YOURSELF

Radio Expo '71 will bring together, for two full days, talented electronics people interested in the development of the state of the art.

Attendance will provide you with the opportunity to
- meet with other fellow communications enthusiasts,
- see working electronics exhibits,
- look over latest electronic equipment from manufacturers' displays
- participate in flea market activities.

Attendance will be drawn from a potential in excess of 250,000 covering all phases of communications.

Facilities at Lake County Fairgrounds, the Radio Expo '71 site, include
- upwards of 50,000 square feet of enclosed exhibit area
- unlimited parking space
- ample trailer, camping and picnic areas

There will be full cooperation from such governmental agencies as
- Federal Communications Commission
- U.S. Army
- U.S. Navy
- U.S. Coast Guard
- Military Affiliate Radio System—International Conference

You are invited to join us at Radio Expo '71:
- The two-day advance purchase ticket price per person is $3.00,
- the at-gate price $3.50.

LOCATION

Radio Expo '71 will be held at the Lake County Fair Grounds, halfway between Chicago and Milwaukee at the intersection of U.S. 45 and Illinois 120. It is 4.3 miles west of the Belvedere-Waukegan exit of Interstate 94 and 6.0 miles west of U.S. 41.

CQ HAS BEEN SELECTED AS THE EXCLUSIVE SALES OUTLET FOR ADVANCE–REGISTRATION TICKETS TO RADIO AMATEURS. The handy coupon at the bottom of this page is your order blank. We have the EXPO 71 tickets in stock, ready for delivery immediately upon receipt of your order. Don't put off mailing your order in to us. The early bird saves the buck.

CQ MAGAZINE
14 Vanderventer Ave.
Port Washington, N.Y. 11050

Please send me ____________ tickets for advance registration to **EXPO 71.** I enclose check or money order in the amount of ____________.

NAME ____________ CALL ____________

STREET ADDRESS ____________

CITY ____________ STATE ____________ ZIP ____________

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Now—What does a classified ad in CQ cost?

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That's right, you read us loud and clear. CQ subscribers can run non-commercial classified ads any and every month absolutely free of charge. All you have to do is send us your mailing label, on a post-card, as proof that you're a subscriber, with your ad neatly typed or printed. There's a limit to three lines in any single month to make space for everybody to get in that needs to.

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Direct All Correspondence & Copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.**

WANTED: Old battery-operated radios of the early 1920's. Need not be working condition. Also want old Iron toys, lead molds. McKenzie, 1200 W. Euclid, Indianola, Iowa. 50125.

SELL: 2 meter Squalo $8; Cushcraft 7 element 2-meter beam model A-1447, $8. HW30, $15. Transmitter section not working. HW29A, $30. Mint--condx, GP-11 Lunch box mobile supply, $12. J. G. Swaney, 5372 Bedford St., Bedford Hts., Oh. 44146.

FOR SALE: Lafayette HA-35A, w/12v PowerSply, 6 mtrs., $50.00; EICO 950A, RCL, $17.50, EMC TUBE TESTER, No. 208, $20.00; Knight T-60 80-6M Transmitter (factory wired), $50.00. All FOB. R. Wendel, WB2YYX, 160-20 Grand Central Pkwy., Jamaica, N. Y. 11432.

SALE: NCX500 Transceiver/AC 500 power sply, $280.00. K3TML, 27 Sheldon St., Wilkes-Barre, Pa. 18703. (717) 824-5310.

HELP! Need to borrow or rent H.P. 608B Sig. Gen. Inst. Man. to copy. K4KQR, 1124 Opelika Rd., Auburn, Ala. 36830.

DRAKE AC-3 for sale. $75 or trade for a Bandmaster Z Match. Walter Hagen, WA2ALV, 30 Sherman Ave., Glens Falls, N. Y. 12801.

OSCILLOSCOPE RCA 3" First $39 takes Model 155C. Works good; not color. IF could adapt. W5PP, Box 493, Abilene, Texas. 79604.

SSB: HT-46 Xmtr, $179; SX-146 RX with AM & CW Filters, $169. Both excellent condx. Phil Serafinas, 925 Coleridge Rd., Balto., Md. 21229.

SELL: Lafayette KT200 general coverage receiver, excellent condition with manual. $30 postpaid. Sever, 612 Lindy Ln., No. Canton, Ohio. 44720.

SELL CRT — Assorted Scope tubes. 3FP7-3JP2-2BPI —913.2 inch and 3 inch metal shields. R. Mendelson, 27 Somerset Pl., Murray Hill, N. J. 07974.

SELL FOR BEST OFFER: NCL-2000; EICO 753; TR-3; Mosley 5-EL CL20; R4B, 4 xtals, T4XB, 2 xtals, Cables; AC-4, MS-4. R. Nevers, 23 Sunrise, Saybrook, Ct. 06475. (203) 388-0372.

HW 22A 40 METER TRANSCEIVER. 12V. Supply, Hustler, Mic., X-Cal, Speaker. Complete Mobile. $150.00. 368 Anita St., Space 101, Chula Vista, Calif. (714) 427-6862.

INVADER 200 with cables and manual. 200 watts SSB and VOX. Perfect working condition. $175. Richard Levy, 30-A Arleigh Rd., Great Neck, New York. 11021.

CB'ers: Here's the Transceiver deal you've been waiting for. International "Executive" excellent shape, ready to operate on both 110 volts A.C. and 12 Volts D.C. Only $100.00. F. Dahm, 86 Garfield St., Natrona, Penna. 15065.

WANTED: Help in getting my ham ticket. David Selwyn, 1348 Victory Blvd., Staten Island, New York. 10301. (212) 273-1097.

WANTED: SX-28 (not SX-28A) receiver in excellent condition. J. H. Gordon, W5GXH, 6 Maple St., Bedford, Ma. 01730.

BSA TROOP 164 needs Novice Equipment for Troop Station for 8 new novices. Appreciate deductible donations or very good prices. BSA Troop 164-Box 171, Fairfield, Ohio. 45014.

WANT: Hi-power final, HB or commercial; tower; Ham band crystals; VTVM. J. M. Hoffer, W1DL, 24 Cherry Road, Framingham, Mass. 01701. (617) 872-5082.

WANTED: DC Power Supply for SB101. Please send card with complete information including price to: WB2GZL, Gerald Scola, 191 W. Street Closter, N. J. 07624.

SALE: HW17A 2m Transceiver, Mobile P.S., 80-2 VFO HG-10. Factory aligned. A. B. Martin, 231 Stonewall, Salisbury, N. C. 28144.

THORDASON: 6.3 V, 6 AMP, $2.00; Pwr 1320V, 200 Mil, $4.75; Chokes 200 and 300 Mil, $3 and $4; UTC Modulation Xfmr, $9. Other ham parts. E. Tischler, 58 Carey Ave., Wilkes-Barre, Pa. 18702.

MODEL 14 Teletype machine complete KSR, $25. CB Goodman, 5826 S. Western, Chicago, Il. 60636.

MAGAZINES FOR SALE: Send list of ham (only) issues needed, money (10 cents each), and Postage costs to Lockheed Amateur Radio Club, 2814 Empire Ave., Burbank, Calif. 91504. Your issues (and any refund due) will be sent promptly.

NEEDED: Glass dial plate for a SX-111.. Also a junk SX-101A, Send price. WB8EEJ, 125 Gardner St., Caro, Michigan. 48723.

FOR SALE: Two 15 type KSR TTY machines including tables, power supplies, keyboards and relays. Valiant 1, CE10B, BC458, VHF152. SX101-a which is now at Hallicrafters factory undergoing a complete checkup and RF-IF alignment. New Johnson TR switch never unpacked, RCA CR17B Conelrad receiver. 14AVQ with 14 RMQ and other miscellaneous parts such as Xformers, Condensers, etc. Reason for selling out is health. L. C. Verhyden, W5OHL, RR 1, Box 119, Magazine, Ark. 72943.

COLLINS: KWM2 and Pwr Sply, $650; Collins Ext. Vfo, $125; Collins Station Cont., $125; 75-S-3C, $550; W51 tower, ham-M, TM-30D Telrex, Tri-Band Beam (2 sets trapped ele, over 300 feet coax), $575. BTI-LE2000, $450; Comdel, Pre-Amp, (Ameco) Combination, $140. SPECIAL PRICE for Entire package. Many extras, all excellent condx. Make offer. WA2HSX, (516) 724-8723.

USM-24C OSCILLOSCOPE, $75; Power supplies-send for list. Joe Meshi, 20920 Anza, Torrance, California. 90503. (213) 542-6723.

SALE: Drake R4-B, $350; Heath SB-401 Factory aligned, $245; Drake 2C, $175; 2NT, $120; All units like new and on the air. P. Margulies. K2GYY, 22 Fern Way,. Berkeley Hts., N. J. (201) 322-5152.

QSLS. SECOND TO NONE. Same Day Service. Samples, 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah. 84015.

HANDSOME engraved walnut desk sign with station call letters. Matching base included. $4.00 with postage and handling. K3IIE, 11866 Sewell Road, Phila., Pa. 19116.

WANTED: PARAGON RD-5 and DA-2, West. RE Tuner, Grebe CR-9 rheostats, DeForest D-10 coils. Joe Horvath, W6GPB, 522 Third St., San Rafael, Calif. 94901.

LISTING SERVICE: Gear to sell? Need Rig? Sellers- $1.00 lists information year; Buyers- FREE. SASE brings details. LISTING SERVICE, Box 1111, Benton Harbor, Mi. 49022.

WANTED: Collins 62S-1. Glen Hill, 316 Barry, Chicago, Illinois.

DRAKE 2-B receiver with Q-multiplier: $200. DX-60 with VFO, $100. Heath SWR meter, $10. Paul Grant, 4440 Stollwood Dr., Carmichael, Calif. 95608.

SSB 2MC 150 WATT Input selective A3H, A3A, A3J Emission 8 Channels Transceiver Instructions, Schematic, $5. Box 8352, Savannah, Ga. 31402.

TRANSFORMER, 2800v. CT, 1.5 KV D.C. wt. 100 lbs. New, $25; Lafayette KT200, 4 band receiver, $30; National HFS receiver, $20; R/S SWR indicator, 470-2800 MC, $20; Hickok mutual conductance tube tester, Model 550X, $25; 10 Amp. Powerstat, $15; Squires Sanders FM Alert receiver, 30-50 MC, $30; Varistat Dimmer, 120v. 25 Amp. New, $15. FOB W2KQA, 127 Nesbit Terrace, Irvington, N. J. 07111.

SALE: NCX-3 Transceiver, like-new, Home-brew AC and DC P/S, $175. J. R. Ritchie, 104 Michael Ave., Ft. Walton Bch., Fla. 32548.

HEATH HW-100, HP-13A. Little used. Excellent condition. With manuals. $320, plus shipping. WA1KZU.

WANTED: One Tube Crosley Pup. Also Rider Manuals, I and II. Have antique radios to swap or sell. Arthur Dineen, P. O. Box 792, Janesville, Wisconsin. 53545.

COLLEGE BOUND, sacrifice mint HW-100. Panel switch 400 Hzt. filter, other mod. New SB-610, HM-15, HP-23, SB-600, mike, patch cords, $375, FIRM. Will separate. Also DX-60 and TR switch, $60; HG-10B, $20; HD-10 fully-modified paddle, $25; Cantenna, $5. You pay shipping. Dave Petreye, WB4HOJ, 8709 Higdon Drive, Vienna, Va. 22180.

PLAINS, KANSAS. Hi Plains ARC annual hamfest will be held May 16th at the Plains grade school auditorium. Basket dinner at noon, & bring your trading gear. Talk in on 146.94 MHz. Camper round up & space available at City Park, May 15th. Airport near park. Registration $2.00 at the door. Further info., write W0NIO, Plains, Kansas. 67879.

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GET YOUR FIRST! Memorize, study: "1971 Tests-Answers" for FCC First and Second Class Licnese. Plus, "Self-Study Ability Test", proven. $5. COMMAND, Box 26348-F, San Fran., Ca. 94126.

I LOVE THE BANJO. My latest stereo LP 36 tunes Dixie to Classics, Banjo Solo. $4.95 PP. RICHELIEU, The Banjo Man, W9JS, 215 S. Washington, Wheaton, Illinois. 60187.

R9A Harvey Wells Rcvr. $15, Viking II xmtr., $85. Viking VFO, $20; Globe Chief Xmtr., $25; Walter Steen, 176 Violet Ave., Floral Park, N. Y.

POSTAL CHESS: American Postal Chess League Box 1022, Greeley, Colorado. 80631.

QSL MANAGER. Will volunteer my services. W7HKI, D. G. Larry Larison, Traveler's Lodge, Edmonds, Washington. 98020.

HEATHKITS Wired, 15% of cost. Price References, on Request. S.A.S.E. P. O. Box 6144, Linglestown, Penna. 17112.

NOVICES: Need help for general ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. AMATEUR LICENSE, Box 6015, Norfolk, Virginia. 23508.

WANTED: Amateur Call Books prior to 1940. Handbooks before 1940. Want QST's prior to 1922. Wireless books magazines and parts. Erv Rasmussen, W6YPM, 164 Lowell, Redwood City, Ca. 94062.

FOR SALE: Gonset GSB-201, Mark IV Linear Amplifier, never on the air. Make offer. Will ship at buyer's expense. Ameco Model PT Preamplifier used --$60 value. Now $30.00. Eico 715 Trans-Match, $35. Midland SWR Meter, minus antenna, $5. Mars S-Meter, $9. Dennis Heinen, WA0WRU, RR 4, St. Cloud, Minnesota. 56301.

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WABASH CO. AMATEUR RADIO CLUB'S THIRD ANNUAL HAMFEST, Sunday, May 23rd. Rain or shine! Door prizes, major prizes and much more. $1 donation for admission. For information, write: Bob Mitting, 663 North Spring St., Wabash, Indiana. 46992.

FOR SALE: Heath TV and FM Alignment Generator, TS-4, $35.00; Heath-Andio Generator AG-9a, $15; all with books and cables. Brand new condition. Ed Schofield, 301 N 3rd St., Lantana, Fla. 33460.

HOBBYISTS: Electronic components at huge savings. Transistors, 2N3566 and 2N3567, 6 for 25 cents, 2N3638, 4 for 25 cents; capacitors 10 cents; carbon resistors, 5 cents. Thousands of components. Catalogue free. SASCO Electronics, 1009 King St., Alexandria, Va. 22314.

FOR SALE: Swan 500-C, 117X-C, Knight SWR Bridge, digital clock, EV619 mike, B&W coax switch, Dow Key coax relay, Mosley TA-33 Jr. and rotor, much more. Don Rubin, WA3JRA, 3919 Bancroft Rd., Balto., Md. 21215.

GALAXY GT-500 Line A.C. & D.C. Complete Heathkit SB-220. Rohn 35' Tiltover base; Ham-M Rotor; Mosley Classic 33. W1AGA, A. LeBel, 50 Walnut Rd., S. Hamilton, Ma. 01982.

SYNTHESIZER, SCHOMANDL, TYPE SN 2-34 with power supply, $100.00. Standard, James Knight Type FS-1000, 1-MCS, $25; Pye, Narrow Band, Type 119 2-meter mobile, $20.00 Converter, Voltage to Digital, Epsco Datrac, B-611. F.O.B. J. Williams, 5134 St. Patrick St., Montreal, 205 Quebec. (514) 768-6626.

SWAN 350C transceiver 550 watts CW/SSB with calibrator, excellent condition, $400.00. Gary Jordan, WA6TKT, 629 Manhattan Avenue, Hermosa Beach, California. Includes 117XC power supply!

WANT TO BUY OR TRADE FOR: Surplus R-C-L bridge; 455KC panadapter. David H. Potter, 2844 San Gabriel, Austin, Texas. 78705.

NEW YORK CITY AREA ONLY: SX42 General Coverage Receiver and FM. Very good condition. With matching speaker, $150.00. Call after 5 p. m. (212) LO 8-0111.

SCHEMATICS HAM CB RECEIVERS TRANSMITTERS, $5. Box 8352, Savannah, Ga. 31402.

RUBBER ADDRESS STAMPS, $2.00. Signature, $3.50. Free catalog. JACKSON'S, Box 443F, Franklin Park, Illinois. 60131.

FOR SALE: Astatic GD104 high impedence microphone with grip to talk stand. Excellent condition. $24.00. WA2GRY, 9 Pensdale Ct., Stony Brook, New York. 11790.

WANTED: Hy Gain HiTower verticals, SX-88 receiver, cabinets for 51-J-4 and R-390A receivers. All types of HRO coils. J. R. Shank, 21 Terrace Lane, Elizabethtown, Penna. 17022.

UHF BASE STATION ANTENNA FOR SALE. Comm Products, No. 541-509. 7db omni 10db offset, with clamps. Like new. Andrew Mueller, Germantown, Wisc. 53022.

4X150A TUBES, $5.95 POSTPAID. Removed from equipment. Tested to Specs; guaranteed. Minimum: two tubes per order. Mail check with order. JSH ELECTRONICS, INC., Dept CQ, P. O. Box 2898, Culver City, California. 90230.

WANTED: R390, R390A, R389, 51J4, 51S1, Racal, Nems Clarke, Marconi receivers. SWRC, P. O. Box 10048, Kansas City, Missouri. 64111.

FOR SALE OR SWAP: Laboratory test equipment — Garage full: Hewlett Packard U.H.F. Signal Generators, $25 ea.; Oscilloscope, storage type 5" screen- similar to Tecktronix, $250., etc. Stereo Equipment: Casette recorder/Playback units-car and home types; cameras, etc. SEND FOR LIST! Murray Marcus, 11 Eldridge St., East Northport, New York. 11731.

SALE: 75A4, $325; C.E. 100V new 2API Scope Tube, excellent condx, $300 F.O.B. Burt Weidenhamer, 3761 18th Ave., N., St. Petersburg, Florida. 33713.

FOR SALE: Hammarlund HQ170C receiver with matching speaker and Heath H013 Ham Scan, $190. Tom Dornback, 19W167 21st Place, Lombard, Illinois. 60148.

FOR SALE: ELMAC AF-67, $35. PMR-7, $50. 6-12-110v PS, $25. OR, $100 for ALL. Excellent condx. with manuals. Shipped COD. T. E. Isaacson, Rt. 1, Branson, Mo. 65616.

FOR SALE: Brand New Reflectometer model CM-52-2 by New-Tronics. $25.00 prepaid. K3YMN, 2185 Sampson St., Pgh., Pa. 15235.

TO TRADE: My Hustler Mobile Ant. with 20 & 15 M. Resonators for either 14 or 18 AVQ Vert. WB2IWH, 213 Dayton Ave., Clifton, N. J. 07011.

SELL: Dow Key Coaxial Relay DK60-G2C. $10. 4 element 20 mtr. beam on a 30' boom with 100 ft. of RG8U. $75.00. Everything A-1. Al Povol, 3538 Centerview Ave., Wantagh, N. Y. 11793.

NOVICE STATION COMPLETE: Excl. HW-16, xtals all bands, key, ant. $95. Deliver in N. E. Also VF-1 VFO $15. P. Kalkstein, WA1NKE, Phillips Acad., Andover, Ma. 01810.

HOOSIER ELECTRONICS Authorized dealers for Drake, Hy-Gain, Ten-Tec, Galaxy, Regency, Hallicrafters. All equipment new and fully guaranteed. Write today for our low quote. HOOSIER ELECTRONICS, R.R. 25, Box 403, Terre Haute, Indiana. 47802.

JOIN THE OLD OLD TIMERS CLUB. If you have been licensed for forty years send your QSL card to Chas. W. Boegel, Jr., W0CVU, 1500 Center Point Road, NE, Cedar Rapids, Iowa. 52402.

WANT: HAM BAND CRYSTALS, Fixed Vacuum Capacitors, and light-weight Tower. J. M. Hoffer, W1DL, 24 Cherry Road, Framingham, Mass. 01701. (617) 872-5084.

WANTED DESPERATELY! The DC/Audio Pack belonging to any Becker Car Radio (Mercedes Benz Radio). Bob Eslinger, WA1BZS, 106 Wallace Row, Wallingford, Conn. 06492.

FOR SALE: EICO 753 and AC/PS in very good condx. Slightly physically modified to its benefit—ie-newly painted cabinet, new knobs. Asking $135. Bob Eslinger, WA1BZS, 106 Wallace Row, Wallingford. Connecticut. 06492.

SELLING: B & W5100-S SSB/AM/CW/RTTY xmtr, 150W, very clean. With 51/SB—B SSB adaptor included. Don Falk, Johnson House, Oberlin, O. 44074.

COLLINS 6KHz Mechanical Filter for 75A4, $35. K0BHM, Gary Yantis, 10809 Johnson Drive, Shawnee, Kansas. 66203.

AM141, 2KW Amplifier less pair of 833A's and coils. First $250. F.O.B. WA3NNB, 13905 Bethpage Lane, Wheaton, Maryland. 20906.

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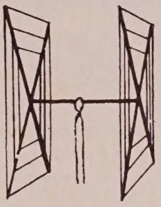

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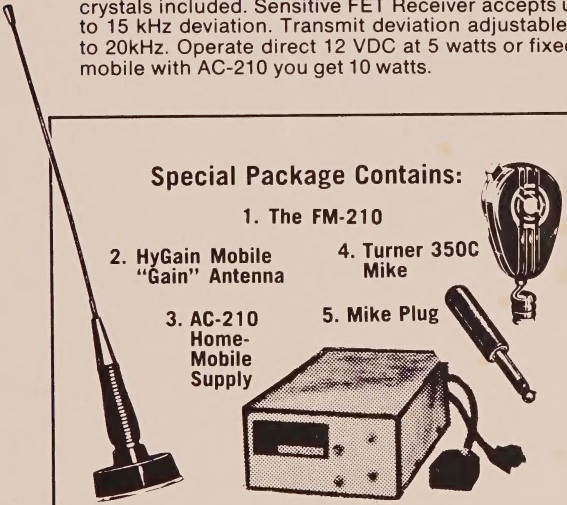

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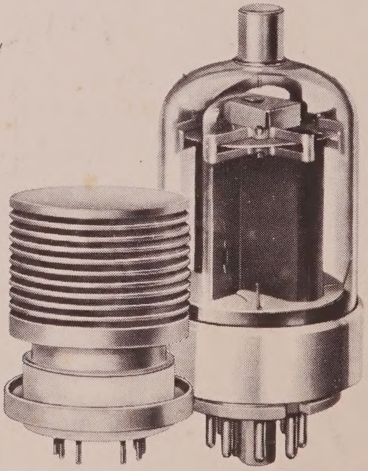RCA